SEP 1 1931

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. 57 SEPTEMBER, 1931 No. 343

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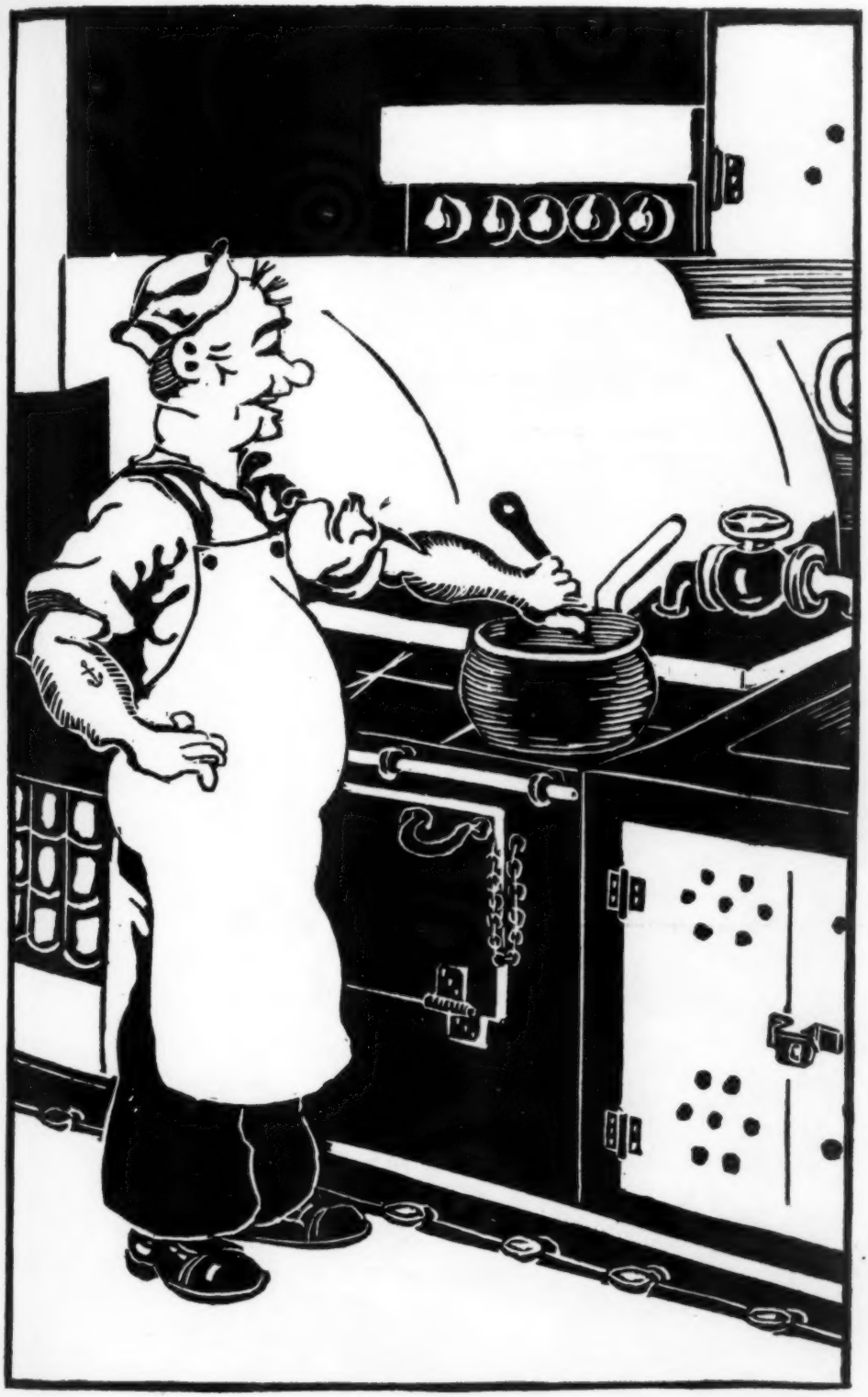

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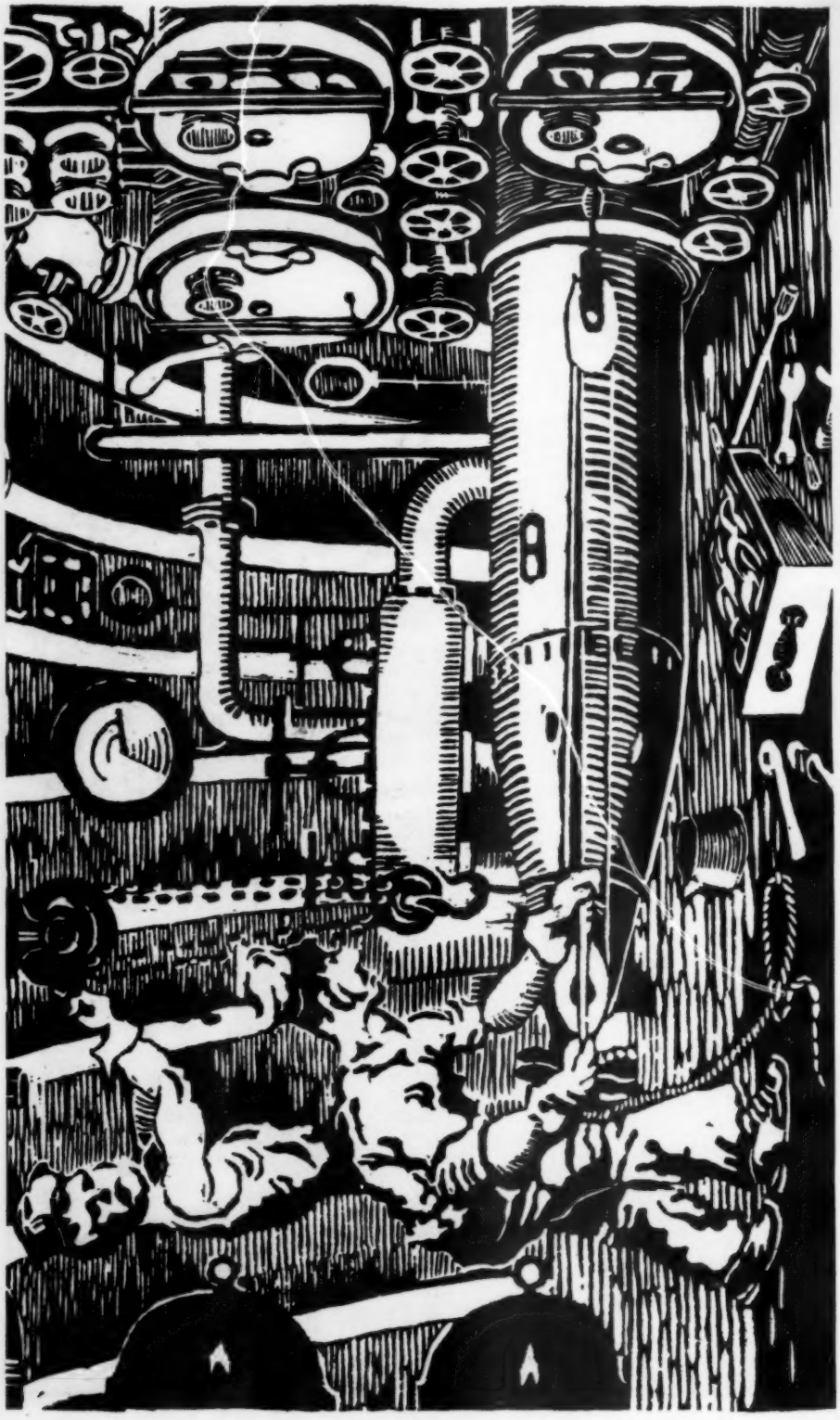

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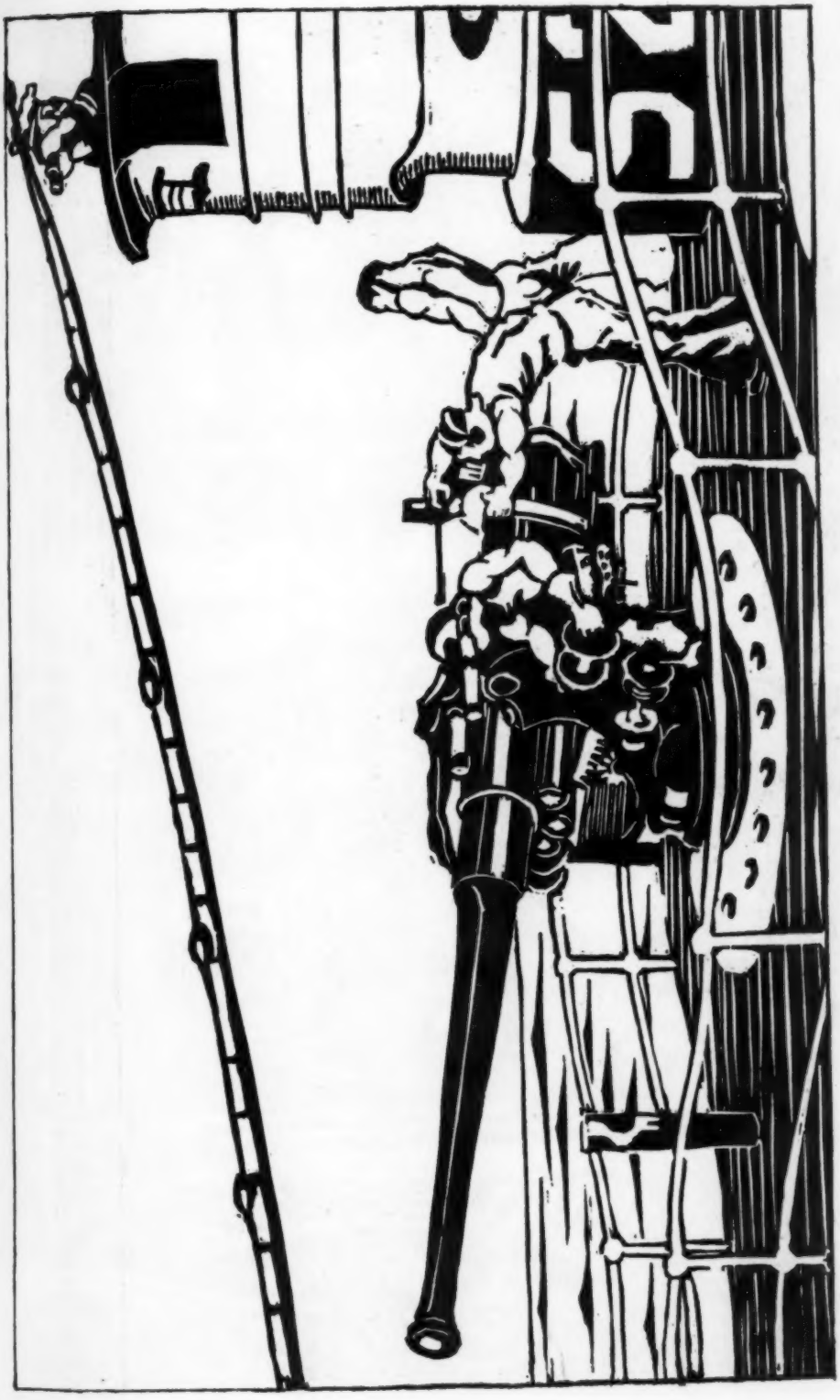

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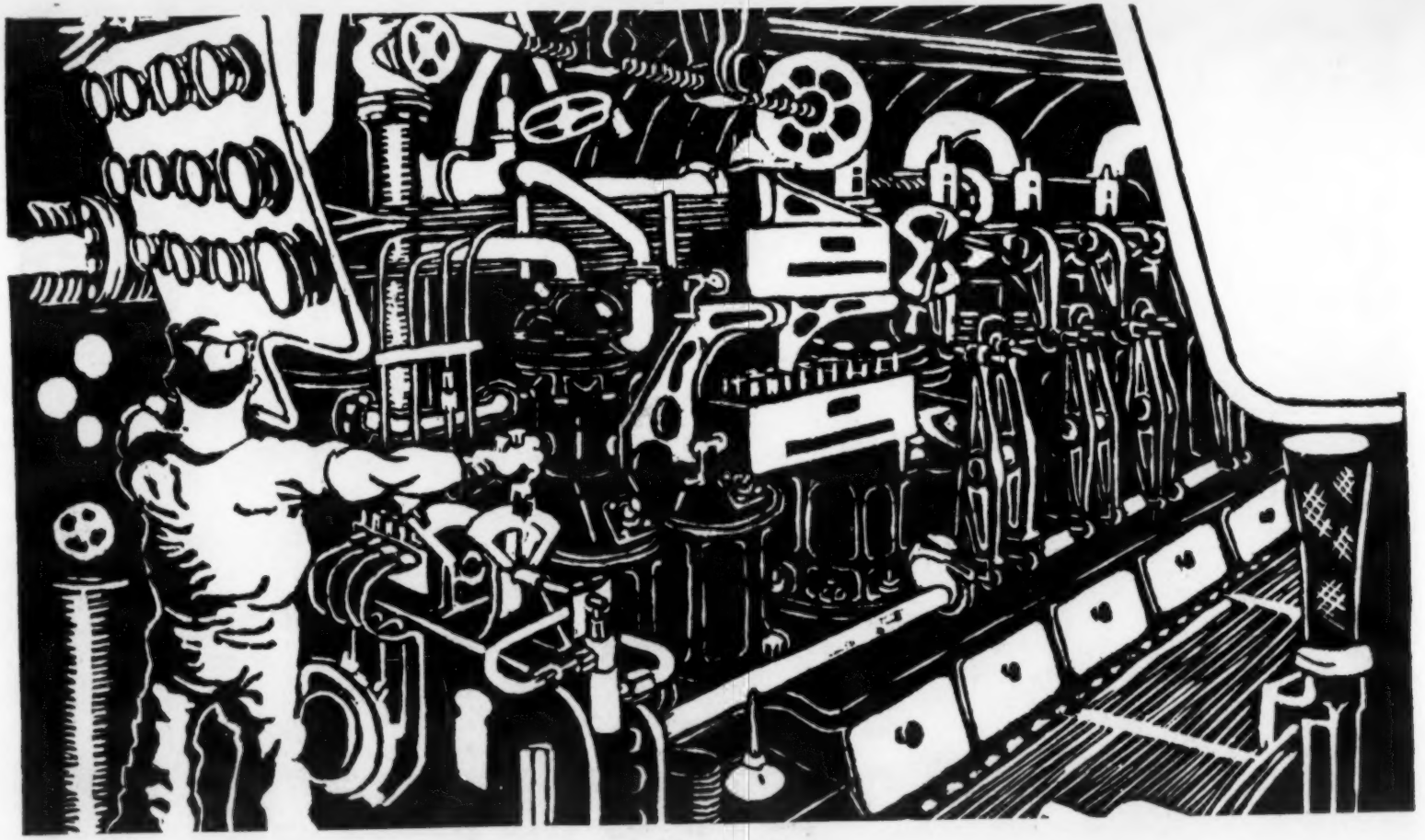

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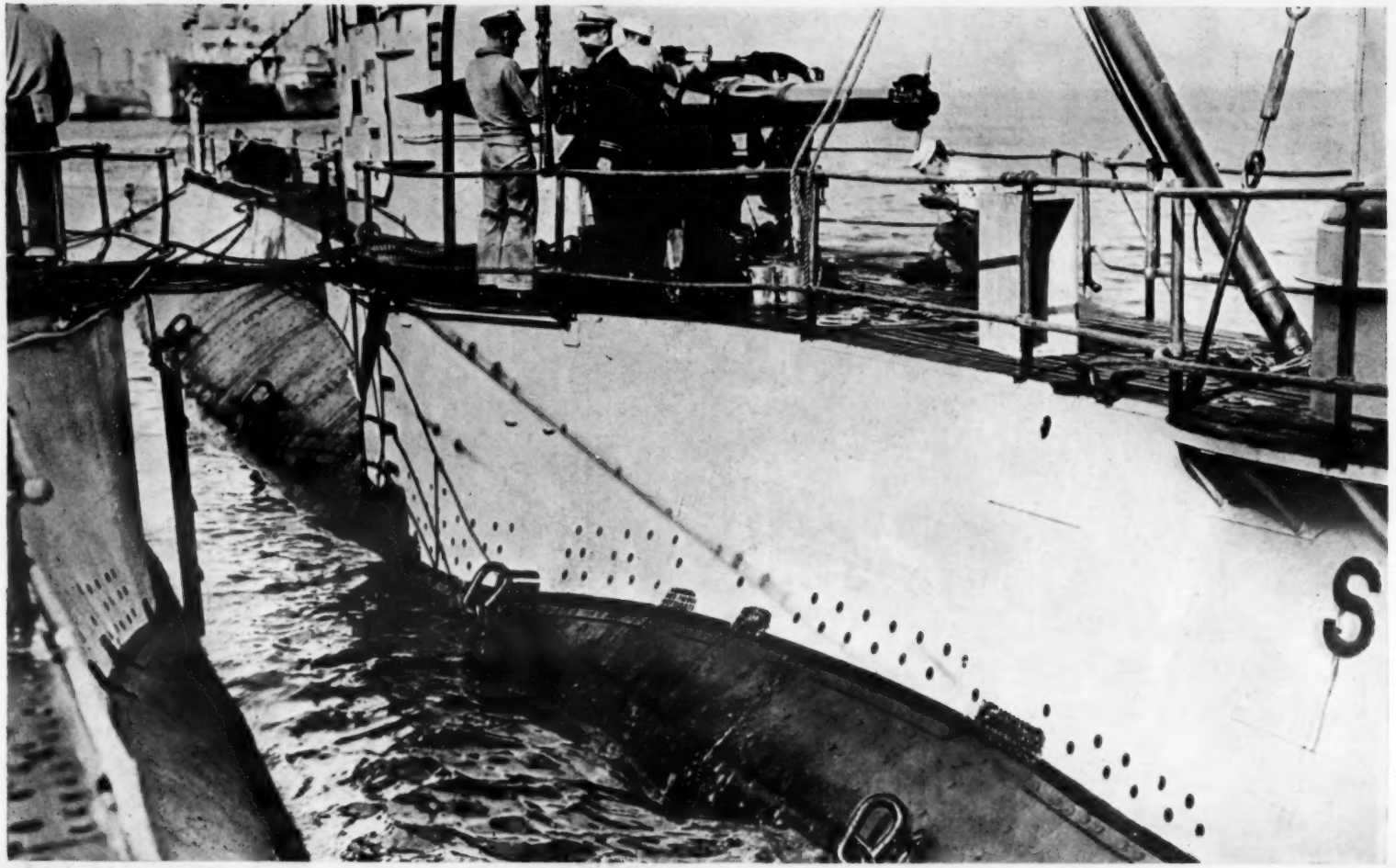

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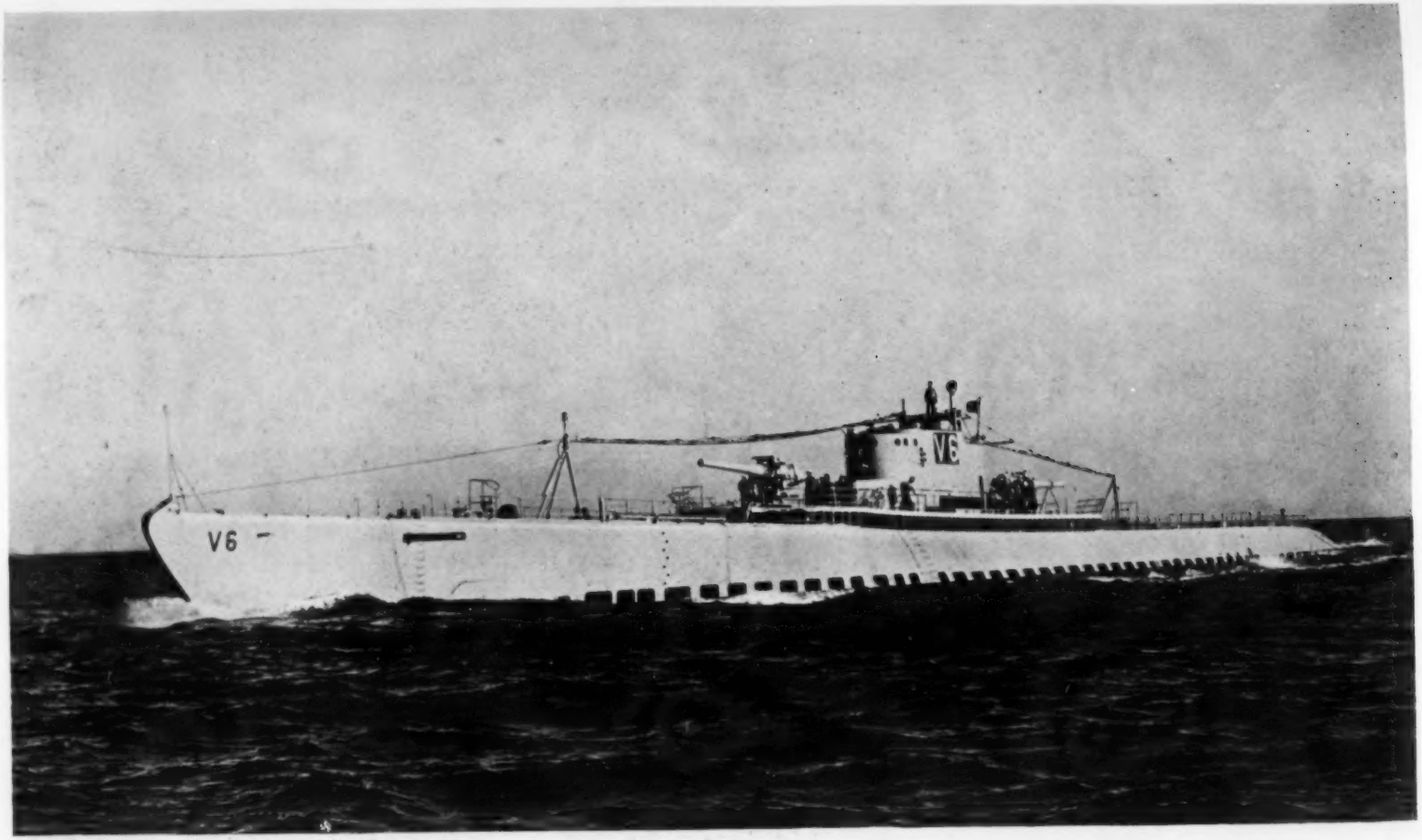

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UNITED STATES
NAVAL INSTITUTE
PROCEEDINGS

Vol. No. 57, No. 9 SEPTEMBER, 1931 Whole No. 343

THE PHILOSOPHY OF LOYALTY

By REAR ADMIRAL F. B. UPHAM, *U. S. Navy*
Chief of the Bureau of Navigation

Address delivered at the opening of the Postgraduate School, Annapolis, June 29, 1931.

IT SEEMS APPROPRIATE, with the advent of a new class, to direct attention to the exceptional opportunity afforded you for improving your usefulness to the service. Since the Naval Academy was first established, indeed, within the last twenty years, the sum of human knowledge and the need for special courses have grown beyond the possibility of giving to every midshipman an education that can cover more than the bare fundamentals. Nor have we yet been able to bring ourselves to lengthen the course by another year. Meantime, by way of affording to as many as possible an opportunity for further study, and this after a period in the fleet, this Postgraduate School was established. Graduates from here are to a very considerable degree better equipped for service. The Navy would welcome opportunity and facilities for affording to every officer the benefits of the more extended education. Since this is not possible, we are compelled to introduce at the outset a system of selection by means of which we can make the best use of the limited facilities, devoting them and our time to those whose record in the fleet gives promise of the best return to the Navy. In other words, you who enter upon these postgraduate courses have been selected, not only from the whole list of availables, but even more carefully from a shorter list of applicants. You thus become members of a preferred class. Your records to date, and the desire that you have expressed to take the courses, give you that preferred status; in consideration of which the Navy looks to you to apply yourselves to this work with all diligence and sincerity of purpose, to the end that the Navy may realize to the full its investment in your education above your fellows.

What with the many technical courses afforded here, together with the more recently adopted one for the general line, we would seem to have covered a very wide field. Recently, however, I have come to realize that, even so, we have not yet touched upon a matter that is of the highest importance; and that is the mental preparation of an officer for writing reports

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of fitness upon those who shall be serving under him. Whatever be our place on the Navy list, and in whatever corps or specialty we may be serving, we soon arrive at the time when we must be writing reports on the qualifications of others. With the passage of time, and with increased rank, the more such reports are we called upon to write. I can think of no more important duty, none of greater importance to the upbuilding of the officer personnel of the Navy. It therefore behooves us to give early thought to matters that will enable us the better to arrive at a just evaluation of the merits of others. In preparation for this duty, we owe to the service and to ourselves a considerable amount of study and of reflection upon those characteristics which will aid us in weighing the value of individuals. In these days of promotion by selection this is particularly necessary, since comparative fitness of officers is a guiding principle; and you will feel the obligation to do the best by the service even as the fitness reports that you write should seek to do exact justice by the individuals upon whom you are reporting.

In my mind two main principles stand out for guidance in writing these reports; first, the example set by an officer, and second, his loyalty to the service. Much has been said, much has been written, on the power of example. All agree that the example which an officer sets is the most potent means of lending to the preservation and to the upbuilding of service standards. The first of the articles for the government of the Navy enjoins upon us that we set in ourselves an example of virtue, honor, patriotism, and subordination. This, then, is a standard by which we may evaluate the merits of officers. And while the article expressly enjoins this standard upon the commanders of all fleets, squadrons, naval stations, and vessels acting singly, it applies to officers of all grades. It is worthy of note, too, that this matter of example is covered in Article One, that is, the very first article. It has occupied the place of first importance for generations; and we may trust that it will always remain on the "front page." I would like the wording of the article better if it stopped right there, with its appeal to a high standard, rather than go on with dire threats for him who may fall short. The impression on the mind would be happier. Now, in all too many cases, there will be tendency to be lenient with those who do not measure up—personal friendship, hardships endured together; many will be the influences to leniency. You will have to make statement in writing as to the personal and military character of subordinates. Your own military character will then be under test, will you have the character, the intestinal fortitude, to record an entry that shall give the whole picture of the officer who in your heart you know not to measure up to the standards? Does that officer set a good example? Is he loyal? I will not go further into the matter of example on this occasion. Little that I could add would lend force to what has already been said or to what is of common knowledge to all.

But the matter of loyalty calls for more detailed examination, and that is the subject I have chosen for this talk—the philosophy of loyalty. We are accustomed to give to loyalty a somewhat restricted meaning, whereas it has a very wide, a very comprehensive application. In these days of mental and moral unrest, when tendencies are toward uprooting old ideals and revising traditions, there results doubt as to just what should be our standards. There has been a tendency to cast out the old gods, the old beliefs; and this without setting up others in their places. There remains a void and a doubt, and until new ideals are formed we are adrift, without compass or rudder. So we are confronted with the necessity of classifying and simplifying our moral attitude in order to give to our lives a guiding purpose, that

we may each of us have an ideal of life which is not alone worthy in its own ends, but one which will exercise beneficial influence upon our fellows. Now, the guiding principle for this classification, for this simplification of our moral outlook, is found in loyalty. But still we cannot be content with the narrow definition in the dictionary which limits loyalty to being faithful and true to the lawful government, or allegiance to a cause or a principle; a fuller definition is, rather, "the willing and practical and thoroughgoing devotion of a person to a cause."*

For a man to be loyal he must first have a cause to which to be loyal. He will willingly devote himself to that cause. He will express this devotion in some sustained and practical way by acting steadily in the service of the cause. It constitutes an ever-present guide, directing him how best to order his life. Fixed upon a cause he has an objective, something to serve; some standard to which to refer his problems. We must each of us have a plan of life. But no man can have a plan of life by merely looking within his own chaotic nature; he must look outside himself to the world of social conventions, deeds, and causes. There will he find a cause or causes that will attract him and claim his service; there will be indicated to him his plan of life. Loyalty to this newly discovered cause will fill this need; it will give stability and fixity of purpose. It will unify his life in the pursuit of this one cause, this cause being thenceforward his life, his will, his opportunity, his fulfillment. Loyalty is social: it concerns and it involves others. In a sense it is impersonal; and in another sense it is personal in that it does involve others. It binds many persons in one service, and in this sense it fills another of man's needs, that of companionship. Loyalty without self-control is impossible. The loyal man subordinates his own impulses to his chosen cause.

The devotion of a loyal man thus involves a degree of self-restraint, submission of his natural desires to the interest of the cause which he has accepted, which he embraces and which he serves. In all of this he looks to the cause for guidance; and his cause tells him what to do. His devotion is entire; he is ready to live or to die as the cause directs. Indeed, to die for a cause were ofttimes easier than to live for that same cause. Many a man has died nobly for his country; many a captain has gone down with his ship rather than leave others to perish when he himself might have been saved. Various features contribute to such heroic conduct—emotion of the moment, patriotism, tradition, what is expected of one, in some instances even a love for the dramatic and front-page headlines.

* The quotation is from the *Philosophy of Loyalty* by Josiah Royce, Professor of History of Philosophy, Harvard University. The author of this article, Rear Admiral Upham, chief of the Bureau of Navigation, recommends this book, for those who are interested, for careful reading. It is published by the Macmillan Company, at $2.50, or it may be obtained from the Institute's book department.

LIFE AND DEATH

By Ernest H. Crosby

So he died for his faith. That is fine,
More than most of us do.
But say, can you add to that line
That he lived for it too?

In death he bore witness at last
As a martyr to truth.
Did his life do the same in the past,
From the days of his youth?

It is easy to die. Men have died
For a wish or a whim,
From bravado or passion or pride.
Was it harder for him?

But to live: every day to live out
All the truth that he dreamt,
While his friends met his conduct with doubt,
And the world with contempt.

Was it thus that he plodded ahead,
Never turning aside?
Then we'll talk of the life that he led,
Never mind how he died.

What most concerns us here then is a more complete understanding of the application of loyalty to our daily lives, its many phases, its ramifications. The first essential is a cause. Next is the choice of a cause—a matter of great importance to those who have not already reached a decision. Certain causes may be worthy in the minds of some and not so worthy in the minds of others; but any cause that contributes to the welfare of mankind may be considered to be worthy. Again, a man may have made a choice earlier in his career and later found reason to choose otherwise, perhaps a more worthy cause. Nor can we quarrel with another man's selection of a cause, provided always that cause contributes to the needs and welfare of mankind. In the more lowly walks of life many a heart glows with a warm light of steady and unfailing loyalty to a cause. The captain of the head has been known to take an interest in his job. Certainly he contributes to man's welfare; and his is a worthy cause. There is no glamour, no emotional exhaltation, no front page about his job. It is the living for a cause that calls for a daily, an hourly conscious and practical and thoroughgoing devotion to the cause.

Over and beyond the individual good that each of us may derive from the choice of a worthy cause, and loyal devotion thereto, there lies the benefit to our cause —the Navy—in our being able to appreciate this benefit to such extent that we may, by our example, spread the gospel of living loyally. By way of arriving at a standard by which to measure an officer's living loyally, we find an admirable text quoted from an incident in English history. You will recall that in the days of Charles I of England it not infrequently happened that the career of a British subject was cut short by the loss of his head. The record has it that the King commanded that there be delivered into his custody the persons of certain members of the House of Commons, men opposed to his own measures. The House returned the answer that they respectfully declined to deliver up any of their members to the King's officers. The following day, in January, 1642, the King went himself to the House, posted guards at the doors, mounted to the speaker's desk and commanded that official to point out to him the persons wanted, that the guards might arrest them. It was a moment in history. Whether or no the speaker had foreseen this dramatic moment, whether or not he had given thought to what he should do or what he should say, matters little. What does matter to us is what he did and what he said. Falling upon his knee, said that admirable speaker:

> Your Majesty, I am the speaker of this House, and being such, I have neither eyes to see nor tongue to speak save as this House shall command, and I humbly beg Your Majesty's pardon if this is the only answer that I can give Your Majesty.

I cite this instance of loyalty, in this case loyalty to the cause of liberty as opposed to despotism, not only because of the speaker's example of loyalty, but more particularly that we may learn from his words a text, that we may, in weighing the worth of one and another subordinate, have in mind such a standard as may be used when we answer to ourselves the question: "Has he (the subordinate) eyes to see and tongue to speak" only that which shall best serve the Navy? We may not assume delinquency in subordinates, lest we do them injustice and thereby lose their confidence. Rather should we give to each full credit for the best until he shall prove otherwise. We take for granted his loyalty as a patriot, as a captain going down with his ship, or as speaker of the House of Commons. We assume, too, his whole-hearted devotion to the service—devotion indicated by the daily practice of service before self, with eyes to see and tongue to speak only for that service. We

may not indicate doubt of his loyalty. The spirit of the service has long since condemned any such method. Rather is it incumbent upon us, by example and by precept, to cultivate an appreciation of loyalty in its more comprehensive sense. However, there is laid upon us again in the articles for the government of the Navy an obligation to be vigilant in inspecting the conduct of those placed under us in the naval service, to suppress all unworthy practices, etc. The loyal servant subordinates self and selfish interests to the interests of the cause. Loyalty without self-denial, without self-control, is, let me repeat, impossible.

Another phase of loyalty is that which is known as loyalty to the mission. Your subordinate may have from you very explicit written orders as to the accomplishment of a specific task. If your orders to him have been in such detail as to embarrass him in the performance of that task he should have the initiative to transgress the letter, if in so doing he can the more surely accomplish the mission. On the other hand, he may, indeed, fail in accomplishment because of lacking initiative, or of lacking the will to carry out his mission in spite of your embarrassing detailed orders. Lacking the will in such case is indicative of deficiency in loyalty, in loyalty to the mission primarily, and to you incidentally. Yours will have been an error in writing orders or instructions in too much detail. As I have indicated, your subordinate's loyalty should be primarily to the mission, and to yourself only as his chief in carrying out the mission. Your own loyalty will be primarily to the mission, but it will include a very specific loyalty to your subordinate, expressed by your lending him every available necessary facility and support for executing the mission; and in yourself accepting responsibility for failure that may be properly attributed to you, for example, orders and instructions in such detail as to handicap even the most loyal and zealous subordinate. The feeling that you will support him is of inestimable value to your junior. . There is due here, however, a word of caution to the subordinate, lest he be carried too far with this idea of the initiative being permitted to transgress orders and instructions. Before he takes such action he must realize that in so doing he takes upon himself the burden of proving that such is the right thing to do in loyalty to the mission. And, in any case, he is obliged, again in all loyalty, to take the first possible means of informing you of his departure from the written word. You will need this as information upon which to base decisions as to future action, since it may necessitate modification of your plan, and of your instructions to other subordinates.

Another phase of loyalty is described as loyalty to loyalty; which is to say that we should acclaim loyalty to any cause which contributes to the welfare of mankind. My friend may be of one religious faith and I of quite another. Yet I would not have him unfaithful to his faith. Nor would I decry another man because he happens not to be of my political convictions or even of my country. What I seek in that other man is that he be loyal to his convictions, loyal to his country, that his loyalty take that form and be of that intensity that gives to him eyes to see and tongue to speak only for his cause. In this connection there is a phase of loyalty not always appreciated by us whose cause is that of the national government; and yet it is of very real value and as such should be recognized not only because of our loyalty to loyalty, but also because it is a worthy contribution to the national cause. I speak of local loyalties, as those of municipalities, of colleges, of states. Each of these contributes in greater or less degree to the larger cause of the nation. Without those local loyalties the people who now serve them would find themselves too far removed, in times of peace, from the national cause with which

we in the service are identified so much more closely. So it is that they have need of nearer interests, of their local communities and groups, to serve as causes. Their sense of loyalty is under cultivation, so to speak; and ultimately, in time of national emergency, it prompts them to wholehearted service of the national cause.

Finally, bringing our examination of loyalty a little closer to our daily lives, let us consider how we practice loyalty on board ship, for instance. If you be of the engineer force and concerned as to the engineering score of your ship, your appeal to the ship's company to be reasonably sparing of fresh water is but an appeal to their loyalty to the ship, to their cause. If you be in charge of a gun division or of a turret, or, indeed, of any unit on board, you seek to have your men return on time from liberty, that the unit may carry on at best efficiency. Your appeal is to their loyalty to the unit as a minor cause in the larger cause of the ship. You comport yourself, and you expect your subordinates to comport themselves in all loyalty to the cause of the ship, and through that loyalty to that due the Navy.

Military bearing and proper wearing of correct uniform are very pertinent evidences of living loyally. You measure the loyalty of your subordinates by the degree to which each of them exercises self-control, and exhibits self-denial in the interest of the cause that he professes to serve. That officer or man is loyal who has neither eyes to see nor tongue to speak, save for the Navy.

★

GEOGRAPHY HAS ORDAINED that the United States, with young Canada on her right and younger Australasia on her left, should constitute the front rank of the whole civilization of Europe facing the newer civilization of awakening Asia. Americans should realize not only the prominence, but more particularly the responsibility, of their position. And Europeans, in spite of their present travails, should realize that the future of white civilization as a whole may require that America take not her eyes off the Pacific, however much she may desire to look helpfully across the Atlantic. And furthermore, Americans should realize the many, many times repeated lesson of history to the effect that, when the people of a civilization become so individualistic and so ease-loving that they care not if their remote dependents are subjugated by a more virile race, that selfish shirking of responsibility, and consequent recession of empire, invariably foretell the downfall of the civilization as a whole—unless an Aurelian and a Diocletian save it from disintegration and destruction as they saved Rome.—GARDINER.

TREATY CRUISERS

By COMMANDER E. S. R. BRANDT, *U. S. Navy*

IN HIS BOOK, published in 1911, entitled *Some Principles of Maritime Strategy*, Corbett defines the battle fleet as the agent for securing command of the sea communications, otherwise known as "command of the sea," and cruisers as the agents for exercising such control or command. He also observes

> ... the more numerous and better adapted they (cruisers) are for preying on commerce and transports, the weaker will be their individual fighting power.

The necessity of following up a victory at sea by exercising the command thus secured and the great economic pressure which the destruction of its commerce puts upon a maritime nation were probably well recognized by the various European delegations to the Washington conference in 1921 and may well have been the underlying cause for the failure to limit cruisers then.

Certainly after the war there was a tremendous amount of shipbuilding to meet expanding world trade. There was also a great deal of cruiser construction. The United States was conspicuous by its abstention from both. It was perhaps just as well that we did not attempt to build ships for the carrying of our rapidly increasing trade until the race to build commerce destroyers by other nations was halted. That having been more or less satisfactorily accomplished at London, we are now launched upon a shipbuilding program that is causing increasing economic pangs in shipping circles abroad.

The two limitation conferences have unquestionably affected the degree to which the maritime powers can exercise command of the sea, in that warship types adapted to commerce destruction have been definitely limited. Among these types the cruiser stands out as the most dangerous to commerce.

In the decade before the World War, the battle cruiser and high-speed battleship had made the armored cruiser obsolete. There was a definite trend toward the small light cruiser of weak individual fighting power but with sufficient speed to overhaul the fastest merchant ships. The prewar German *Emdens* were typical examples. Against unarmed merchant ships they were the cheapest and most effective type. With the mounting of 5- and 6-inch guns on merchantmen they became outgunned by their normal prey and the 6-inch-gun cruiser was evolved to take their place.

The demand for speed now began to make cruisers too expensive for quantity production, an essential to an effective commerce destruction force. The "sloop" was evolved as a concession to the original cruiser idea. Meanwhile designers began a race for bigger and better 6-inch-gun cruisers.

The results of naval actions of the war seemed to indicate that a heavy and fast light cruiser and a very fast and heavy battle cruiser were the correct types for future cruiser construction. The cruiser submarine made its appearance. The value of volume of gunfire in support of destroyer attacks had its effect on cruiser design. The armored cruiser with its heavy guns was definitely discarded, as being too slow to catch the light cruiser and too weak to stand up to the battle cruiser. The battle at the Falklands demonstrated the

power of the battle cruiser, the hopeless plight of the armored cruiser, and the chance the light cruiser had of escaping. The battle of Jutland demonstrated the ability of the German battle cruisers to take heavy punishment, the inability of the armored cruisers to influence the outcome of the battle, and the ubiquitous success of the light cruiser.

Consequently we find Great Britain building a *Hood*, the United States building six huge *Lexingtons*, and Japan embarking on the eight-eight program of battleships and battle cruisers. Great Britain began building the *County* class of light cruisers and the United States the *Omaha* class. France, Spain, Italy, Holland, and other minor naval powers began building fast light cruisers with 6-inch guns.

Naval attention everywhere was preoccupied with battle cruisers and light cruisers. Then suddenly the British Admiralty discovered that it could not afford to go on with the naval race for supremacy, nor could it afford to stop if others went on. The light cruiser and the battle cruiser were making a joke of national budgets.

The Washington conference upset all previous calculations by practically eliminating the battle cruiser from future consideration and by creating the 10,000-ton cruiser carrying 8-inch guns—a type no navy could subsequently afford to be without and yet one for which war experience provided no justification as far as European navies were concerned. Our own cruiser needs are somewhat different.

If Corbett's definition of a cruiser is correct these ships are not cruisers, for, with their 8-inch guns, they are distinctly fighting units. As a means of preying on commerce, they are individually no more effective than the true 6-inch-gun light cruiser except for their greater cruising radius. As a means of breaking up torpedo attacks on the battle line they are less effective than 6-inch-gun cruisers. As scouts they possess no more eyes. As a fleet type they are abnormal. They are essentially destroyers of commerce destroyers.

Just as the torpedo-boat menace was met by the torpedo-boat destroyer, the cruiser menace to commerce appears to have been met by the cruiser destoyer appearing, under the arbitrary characteristics of the Washington agreement, as of 10,000 tons and carrying 8-inch guns. The only excuse for unarmored 10,000-ton cruisers carrying 8-inch guns is to destroy cruisers carrying 6-inch guns, which are operating on trade routes. They do relieve the fleet of this duty and, if so employed, increase its mobility and freedom of action. If this be their true function, it should divorce them from fleet operations of a tactical character. The fleet must still be supplied with ships capable of providing it with the service of information and security for we still need scouts and defense against torpedo attack.

The more true light cruisers mounting 6-inch guns our enemy has operating against commerce, the smaller the number of heavy cruisers we can withdraw from the protection of commerce for duty with our own fleet. When we limit the number of cruisers in our Navy we sacrifice either security for our fleet or security for our commerce. We cannot have both if the enemy has a greater number of cruisers than we have, especially of the light cruiser type. This consideration has affected British naval needs. For every light cruiser operating on trade routes there should be a cruiser destroyer on its trail for effective protection of commerce and communications. Fifteen heavy cruisers will not go far nor would twenty-five be sufficient against a navy with "parity" in fighting strength. The fast armed merchant cruiser makes it impossible to fix any number of cruiser destroyers as adequate.

As though in recognition of the inadequacy of the treaty cruiser, through lack of sufficient number ever to be equal to the full protection of trade routes, the speed of

this type has been reduced to a point lower than that of many of the light cruisers presumably their prey. The speed it should have to fulfill its true function has been put into gun power and "life" which will permit it to give a good deal and to take some punishment. We have robbed Peter to pay Paul and have succeeded in creating a hybrid that is neither able to run down the 33-knot light cruiser nor to survive contact with a battle line. They cannot long survive contact with each other.

One class alone in foreign navies seems to be actually at their mercy—aircraft carriers. They can run down and out-gun any such except the Japanese *Akagi*, though their arbitrary life is less. The power that they have of destroying carriers indicates that they should be so used in fleet operations which, in turn, will force an enemy to give his carriers heavy escort, thus weakening his fleet or limiting the mobility of his air force.

We thus see that the heavy cruiser is not a cruiser in the sense that it is an agent for the exercise of command of the sea, but is a fighting agent for depriving others of such command. We must look to other agents less limited in numbers for the exercise of command. We are permitted to have an inadequate number of light cruisers carrying 6-inch guns for this purpose, inadequate because of the tonnage put into treaty cruisers. We have no network of bases supporting each other along the world's main trade routes to increase the mobility and efficiency of cruisers, such as England has. Consequently our light cruisers must have long fuel endurance which means that they must have a comparatively large displacement, which in turn means fewer cruisers under a total tonnage limitation. Where England can use 6,500-ton cruisers efficiently, we need 9,000-tonners or larger solely through lack of spaced fueling bases along the main trade routes. Therefore they might just as well carry 8-inch guns but this they may not do.

Command of the sea cannot of course be exercised until it is secured through the defeat or immobilization of the enemy fleet. Should this be accomplished, there would probably be released sufficient cruisers, light and heavy, to exercise command, provided defeat of the enemy fleet did not all but destroy our own. Certainly cruisers will suffer heavily in a fleet action. Should such be the case and the enemy possess a large merchant marine, we might find ourselves with a badly crippled navy unable to exercise the command which would follow a victory.

While the objective of a fleet in war is properly the enemy fleet, the object for which the war is fought will not necessarily be obtained by victory in a fleet action which may or may not secure command of the sea. Command of the sea must be exercised if pressure sufficient to force peace is to be placed on the enemy. Naval forces are but the instruments in naval operations designed to create this pressure. The pressure being economic, involving the isolation of the enemy from supplies of food and raw materials, it is directed primarily against shipping and, therefore, does not require the use of heavily armed ships, but rather of fast ships.

With the defeat of the enemy fleet, the 8-inch-gun cruiser is released for its primary purpose of cruiser destroying and general protection of trade routes from which it can be driven only by the battle cruiser. Its chance of survival in a fleet action, however, is small.

The existence of each type of warship, carrying its own special menace, forces upon navies a countertype. With the possible exception of the new German *Deutschland* there is no countertype for the treaty cruiser except the battle cruiser, and of these there exist only seven in the world as against ten times as many treaty cruisers. Under the circumstances, since the treaty cruiser has apparently come to stay, the indications are that the battleship, if re-

placed at all, will be partially replaced by a battle-cruiser type.

As the present enormous battle cruisers are far more powerful than necessary for treaty-cruiser destroyers and as they are definitely conceded to be obsolete as battle line ships, we may expect that proposals to replace one 35,000-ton capital ship by two small battle units will be advanced. This will result in the gradual elimination of the great battleships of present-day navies.

Since, however, the heavily armored ship is, in the last analysis, the backbone of naval power, we may expect that this type will be retained in some form. It is possible that in replacing one large battleship with two smaller ships of the same aggregate tonnage, we may find it appropriate to construct one with speed at the expense of armor protection and the other with armor at the expense of speed, thus maintaining an armored battle line of smaller units and adding a countertype to the treaty cruiser. The general effect would be to reduce the individual tonnage of warships to around 16,000 tons as a maximum and, probably, to reduce the heavy guns to about 13 inches or less. International agreement would, of course, be necessary.

What would be the characteristics of these new types? The fast type would probably carry four to six heavy guns and be capable of 34 knots or more. For destroying treaty cruisers, a gun of 10-inch caliber would be sufficient, but would make them forever fugitives from true battleships. Perhaps a two-gun turret of 10-inch guns forward for chasing treaty cruisers and a twin turret of 12- or 13-inch guns aft for standing off battleships would be feasible.

The 16,000-ton battleship could probably not mount over six 12- or 13-inch guns with full armor protection and still be capable of a 21-knot speed and a 10,000-mile radius.

Should all present battleships be so replaced, we would still have fifteen battleships and in addition have fifteen heavy cruisers to take care of the fifteen treaty cruisers in the British fleet. It is probable that the cruising radius of these new types would not be as great as that of the present large battleships, which would tend to weaken our position somewhat in the Pacific where there seems to be little to fear. Treaties have disposed of immediate danger and economic forces tend to discourage belligerency.

Should such types be accepted, we should then have in our Navy

15 16,000-ton, 21-knot battleships,
15 16,000-ton, 33-knot super-cruisers,
18 10,000-ton, 32.5-knot treaty cruisers,
23 7,500-ton, 33-knot light cruisers.

This is an increase from the present built, building, or authorized of from forty-three to seventy-one units, provided we built up to our parity allowance.

It has been pointed out that plane carriers, except for the American *Lexingtons* and the Japanese *Akagi*, are out-gunned by the treaty cruiser. This gun power of the treaty cruiser must necessarily affect the characteristics of carriers laid down in the future. They must carry 8-inch guns and have either great speed or superior life to cope with the treaty cruiser.

Aircraft carriers are limited to 27,000 tons and to 8-inch guns for those laid down or acquired in the future. While there is a demand for more numerous carriers, small carriers must sacrifice speed or life and cruising radius, if they are to be able to defend themselves against treaty cruisers. If they are lightly armed and armored they must be escorted and the more there are, the more ships must be drawn from fleet service to escort them or they must remain with the fleet and thereby hamper it. It would appear that carriers should be strongly armed, well-protected ships, if they are to provide the best opportunities for the planes they carry. This can certainly be done within

the tonnage limits, probably about 20,000 tons, which would permit construction of three more. These would, of course, be augmented in time of war by converted liners.

The destroyer type has also been affected by the treaty cruiser which has reached a size and gun power that makes it a legitimate torpedo target. Post-war destroyers are larger and faster than ever, and the tendency is toward larger and longer range torpedoes. There are "leaders" in foreign navies reported to have made over 40 knots on acceptance trials. Unsupported destroyers must have the speed to escape from fast light cruisers. There is little doubt that destroyer types of the immediate future will include one having a speed of 40 knots and a displacement of around 1,800 tons—in effect a torpedo cruiser. This will be necessary if the torpedo is to retain its present menace against fighting ships, among which must be included the treaty cruiser.

The present tendency toward speed in surface ships makes the submarine less and less satisfactory as a tactical weapon. This is reflected in the drastic tonnage cut at the London conference and in allowing Japan parity. The more navies are limited the less they can afford to indulge in submarines. A low global limitation would probably have the ultimate effect of eliminating the coastal submarine from the major navies and reducing the number of fleet submarines to a minimum. Mine-laying submarines will always be found useful.

The treaty cruiser as a cruiser destroyer has greatly limited the effectiveness of the armed merchant cruiser which has generally less speed and gun power than the light cruiser. This may account for the very evident dislike the British have for treaty cruisers in other navies and their great desire to see them strictly limited, especially in the Mediterranean and in the Far East.

The process of adjustment of navies to the treaty cruiser is going to be a long and expensive one, a result altogether out of accord with the spirit in which the Washington conference was conceived. The framers of the limitation treaty had apparently no idea that in placing a limit on certain characteristics they were forcing upon navies a new type, the effect of which would be to increase naval expenditure all along the line. We feel that we must have these cruisers because they are the biggest and most powerful ships allowed in their class and because others have them. There is reason to doubt that the class is so valuable to naval operations as to warrant tying up much tonnage and money in them. There is this to be said for them. They are essentially defensive in character and indicate a non-aggressive policy of the nations to which they belong, in that they tie up cruiser tonnage which otherwise could be put into types especially adapted to commerce destruction. They do limit the power of any one nation to exercise command of the sea and, if kept in reserve during a fleet action might rob this action of its real value, which is, of course, the exposure of an enemy's commerce and communications to unhindered attack.

Whether a countertype will be evolved or whether the treaty cruiser will become obsolete in its turn twenty years from now remains to be tested. In our own Navy we have under consideration another hybrid type, the cruiser carrier, a light cruiser mounting eight 6-inch guns and equipped with a flying deck from which a flight of planes may be launched and upon which surviving planes may be received. By the London treaty 25 per cent of 6-inch-gun cruiser tonnage may be so constructed. Under certain circumstances in which the planes can be used, such a cruiser is more than a match for an 8-inch-gun cruiser. In good weather it is a superscout with a greatly extended range of vision. These same qualities make it a great menace to

commerce. Its weaknesses are light protection, moderate gun power, and vulnerability of its flying deck. On the whole it is theoretically the best cruiser type for all-around service which has been conceived and one which the treaty cruiser must respect whenever flying conditions are favorable. A treaty cruiser which attempted to drive a cruiser carrier off a trade route might find itself engaged with a hornet's nest from which there was no escape.

Is it also possible to develop the regular 6-inch-gun cruiser into a fast heavily gunned ship which can close a treaty cruiser with its speed, and overcome it through sheer volume of fire. A 6-inch-gun cruiser with the same number of guns can deliver from two to three times the number of shots per minute as can an 8-inch-gun cruiser. At ranges where 6-inch can penetrate, the 6-inch cruiser will inflict the greater damage and should survive a short hot action. No treaty cruiser could long stand up against a 6-inch-gun cruiser with nine to twelve guns under such circumstances.

Treaty cruisers have the "punch" with their 8-inch guns, but they are under the necessity of continually "pulling it" by having to remain outside the penetrative range of their opponents, which means that they have to stay on the fringes of the battle or run the chance of quick and complete destruction. They must watch as anxiously as any battleship for torpedoes. They haven't the volume of fire to stop a determined torpedo attack. They do not fulfill a battle function of the fleet.

Their rôle seems to be stiffening an advanced scouting line of weaker ships such as light cruisers, destroyers, or merchant scouts; attacking carriers in unfavorable flying weather; and chasing light cruisers off trade routes provided they do not get chased themselves by light cruisers able and anxious to fight and close the range.

The 35,000-ton battleship is passing. No one thinks of building any more. Everywhere there is the inclination to extend their "life" and in some quarters, to reduce the size of any to be built. Each conference sees the battle line reduced by a few more leviathans. Why? They cost too much for the naval return they give and it takes a swarm of light craft to get them safely into action. They have a habit of limping home from action. If there is anything more like the proverbial white elephant, than a badly damaged battleship at sea, it is two of them. They are indispensable, however, if an enemy has them and, for that reason, we may expect to see them as over-aged veterans in a future war, either sulking at anchor or putting to sea with as many screens as a seven-veiled dancer. Veils do not stand rough treatment. Neither do screens in a fleet action. With limited navies it is scarcely good strategy to risk a fleet action with all available naval forces, for the cost of victory might be so great that we can, after all, exert no great economic pressure on our enemy.

Perhaps it is just as well that we have some cruisers which it would be suicidal to bring into a fleet action and which are thus the nucleus of a naval force after the action. Having had a good, hard, satisfying battle in the traditional Nelsonian manner we could then get down to the important business of starving an enemy people into submission through relentless war on his commerce.

England has six 8-inch-gun cruisers on over-seas commerce protection work at present and intends to add at least two more, leaving but six in the Altantic with the fleet. One seems to have a roving commission. This looks like a proper appreciation of the treaty cruiser's rôle.

A FURTHER APPLICATION OF OUR PUBLICITY POLICY

By LIEUTENANT COMMANDER F. E. M. WHITING, *U. S. Navy*

IT IS PRACTICALLY thirteen years since the Armistice. A new generation is here; a generation that knows nothing of the hardships, deprivations, and sufferings of 1914–18, except from reading or listening to tales of personal experiences. It is true that many novels of the war now appearing are realistic, but there is a certain glamour about them that discounts the hell of those four years. Yarns, no matter how interestingly spun, lose most of their horror as time dims the events which gave them life. So we have with us a growing generation utterly ignorant of war, a generation which we all hope will never meet it. The costs of the last war are mounting yearly. Hospitalization, adjusted compensation, bonuses have already reached tremendous sums. Every possible means should be taken to prevent another such holocaust.

In the last twenty years two branches of the service have advanced by leaps and bounds—aviation and communications. It is the latter with which I wish to deal, not simply with our internal communications which transmit orders and information within the service, but rather with those communications which form the service of information between the Navy and the general public.

Communications of every conceivable type have expanded about as rapidly in the last twenty years as aviation. Think of the number of books, magazines, newspapers, and advertisements today and cast your mind back fifteen or twenty years ago for comparison. How many radio broadcasts were thrown country wide ten years ago? I can remember distinctly listening, on the edge of an interested crowd, to the Yale-Harvard game being read from a ticker, about 1905. Now everyone turns a dial. There is the Yale-Harvard game. If that is uninteresting we shift to the Army-Notre Dame game or even to the Pacific coast. Everyone is expressing himself freely, some inadvisedly, but in the main with an attempt to tell the truth as he sees it. Is it right and proper for the Navy to remain continually quiescent? Should we issue from the department or high commands uninteresting statements of fact? Can we afford not to teach our personnel to explain our need for existence at every opportunity to the citizens of this country? Is it disloyal for us to do so? Should we be discouraged if we make a few errors of fact provided we are loyal to the Navy? I think the answer is "No," and, that unless we do so, the Navy will not be ready if the time ever should occur when the nation needs us immediately.

The power of that intangible asset known as public good-will is so far-reaching and so important to us that no effort should be spared to cultivate it. Our very system of government requires the fullest publicity on all subjects—the public demands it. To the average American the only purpose of a navy is to permit him to proceed in the even tenor of his way without interference or molestation from an outside source. We may talk about protection of trade routes, communications, containing an enemy's fleet, etc., in military terms, but unless the listener has much leisure, or is a student of military affairs, these terms and phrases will pass off his back as water off a duck. We must

express our needs to him in a language he will readily understand. For example, recently, while glancing over the *Congressional Record*, I came across the following remarks by a Congressman in regard to the modernization of battleships, which are quoted in part.

We propose by this modernization program to increase the elevation to 30°, thereby giving a range of 35,700. We have already done so on four ships—*Nevada*, *Oklahoma*, *Pennsylvania*, and *Arizona*.

On older ships than these the elevation of these guns increases the range 11,200 yards . . . In addition to the elevation of guns, it is proposed to increase the deck protection from 3.5 to 5.5 inches, an increase in deck protection of over 60 per cent, making the ship far superior to her present condition . . .

The penetrative effect of the nest AP bomb today might be 3.5 inches at 6,000 feet. To penetrate 5 inches would require an altitude of 13,000 feet, and to penetrate 5.5 inches would require an altitude of 15,000 feet . . . The ship is, therefore, far less vulnerable to bomb attack with the added deck protection . . .

The Navy is the first line of our national defense. In the case of national emergency it must hold the battle line while the resources of the nation are being mobilized. It must ever be in a state of readiness both in material and personnel . . .

The Navy has no better friend than this Congressman. Furthermore his general, yet vast detailed knowledge of matters of policy, personnel, and material is probably far greater than that of many naval officers. His speech is quoted only to indicate the detailed facts required by the public.

Education and indoctrination in the Navy has always been along lines of "not talking" for publication. Even in some assignments to duty (publicity bureau, aide to commandant, etc.), there has been ever present the idea, "careful what you say." In an attempt to analyze the reasons therefor, its foundation appears to lie in the fact that we try to keep too much secret and end by keeping little or nothing. There is a physical limit to the length of time a secret may be retained as such. It is doubtful, for instance, whether the fact that we had a 40-knot cruiser, a 50-knot torpedo, or a 300-knot plane could be retained a secret after its manufacture had once reached the quantity production stage. It seems that the time has come when we must radically develop our naval publicity and "service of information" policy to educate our officers to go amongst the people and talk.

After listening for two years to many congressional hearings and other public meetings, most of which are published, it appears that we need have little or no fear about divulging national or naval secrets. So far as the average naval officer in the field (not at a design desk) is concerned there is no danger. Before any piece of machinery goes far beyond the design stage money must be spent and with that goes attendant publicity.

With the exception of aviation, which has grown to be one of the most important arms of the service in the last decade, the Navy has designed and built few new ships since the Armistice. There are a few submarines and cruisers of post-Armistice design and eleven new destroyers will shortly be laid down. Whether any more battleships of 35,000 tons will be built is somewhat problematical. Our submarine and destroyer tonnage is of old design. The Navy is, and has been for some years, advocating a progressive building program which it has not been altogether successful in obtaining. Pressure from the pacifists is being applied throughout the country to prevent our replacing ships. In fact, so great is this pressure, that the very operation of vessels is limited. If the pacifists could, they would keep us swinging at anchor the year round. They use every means to prevent the Navy from accomplishing its legitimate purpose, so why should we not use every fair means and

argument to acquaint the citizens of this country with its needs?

To change from one type of armament to another is expensive. The very cost of operating ships is tremendous. Often when a war game or problem is completed, with few apparent results, one feels that his actions are similar to that of the King of France marching an army up a hill and marching down again. But any thinking civilian must realize that such problems, or war games, are necessary for successful training. Before any weapon is adopted or discarded its usefulness must be thoroughly investigated. We are only human; we make mistakes, plenty of them, but it must be in the back of everyone's mind that we wish continually to develop new means, methods, and materials, the better to use our existing ships to defend our country. If the civilian knows what we are endeavoring to accomplish he will back us by advancing funds. If, however, only the pacifist reaches his ear it makes our position doubly difficult.

It is necessary for us to inform civilians constantly that, should a war break out, the only navy available (during the first eighteen months) would be, with hardly an exception, that navy which is in being when war is declared. This, very few people realize. It is extremely doubtful if a single ship, submarine, destroyer, cruiser, battleship, not yet laid down would appear for twelve months, and the number prior to eighteen months would not sway the balance of any war. Certain merchant ships may be converted to auxiliary cruisers, airplane carriers, and tenders but, while useful, they will not decide any major issue.

After eighteen months the tremendous power of organization and manufacture of this nation will produce war material so rapidly that we need fear no other nation. This is an unanswerable argument to maintaining a navy virile, strong, and active. The peace of mind of 122,000,000 citizens should demand it and will do so, if it is explained by every officer at every opportunity.

Any explanation of the necessity for a strong navy must be in terms readily understandable to the public. The average citizen has so many other matters to think about that, unless we put the duties and necessities for a navy in the language he speaks, we shall not succeed. Despite the great advance in communication and general knowledge there is not sufficient time for the average person to know more than one language, his own. If we speak in terms of advance guards, main bodies, attacks from the flanks, we are defeated before we begin, for we are talking technical terms which go over his head. We must learn to talk to the civilian in his own language.

I have heard it often expressed that the Navy is the insurance the country pays for peace. So it is, if it is sufficiently strong to prevent any nation from attacking us. In the event that any nation is foolhardy enough to attack us, the citizen may rest assured he need not fear for his family's safety while making preparations to bring the war to a successful conclusion.

In this respect the Navy is totally different from the Army. The Navy realizes that it must fight with the material at hand. The peace-time Army is largely a skeleton organization which relatively will be more greatly expanded in time of war than the Navy. Therefore, the real insurance, the type that pays immediately half the policy without question upon notification of death, is a navy. It must be ready. If it is not, the insured (citizens of the country) will finally pay greatly increased premiums in unnecessary loss of life and property. To a large degree the country has been borrowing on its premiums since the Armistice. This is due to three causes. First, a tremendous excess of certain types of ships built during the last war, but not completed when hostilities

ceased, second, a reserve of man power still of an age and sufficient experience to man our existing Navy; and, third, the very necessary and natural desire to economize in order to discharge our huge indebtedness. The time has now arrived when the first two assets have, to a large degree, passed their years of usefulness and are rapidly being placed in an inactive reserve of doubtful value.

What is the difference in cost of a first-class navy, ready in all respects, ships modern or being replaced, officers and men well trained in seamanship, gunnery, and tactics, together with a high standard of morale as against a navy inferior to our needs as the richest nation in the world? A penny a day for each citizen will more than meet our total requirements of operation, replacement, and morale. Viewed in that light it is not a large sum. At present it is somewhat over three-quarters of a cent a day per person.

So it appears that the time has come for the Navy Department to develop actively its present broad information policy, to encourage officers, young and old, to tell the country its needs, and to cease to be the "silent" service.

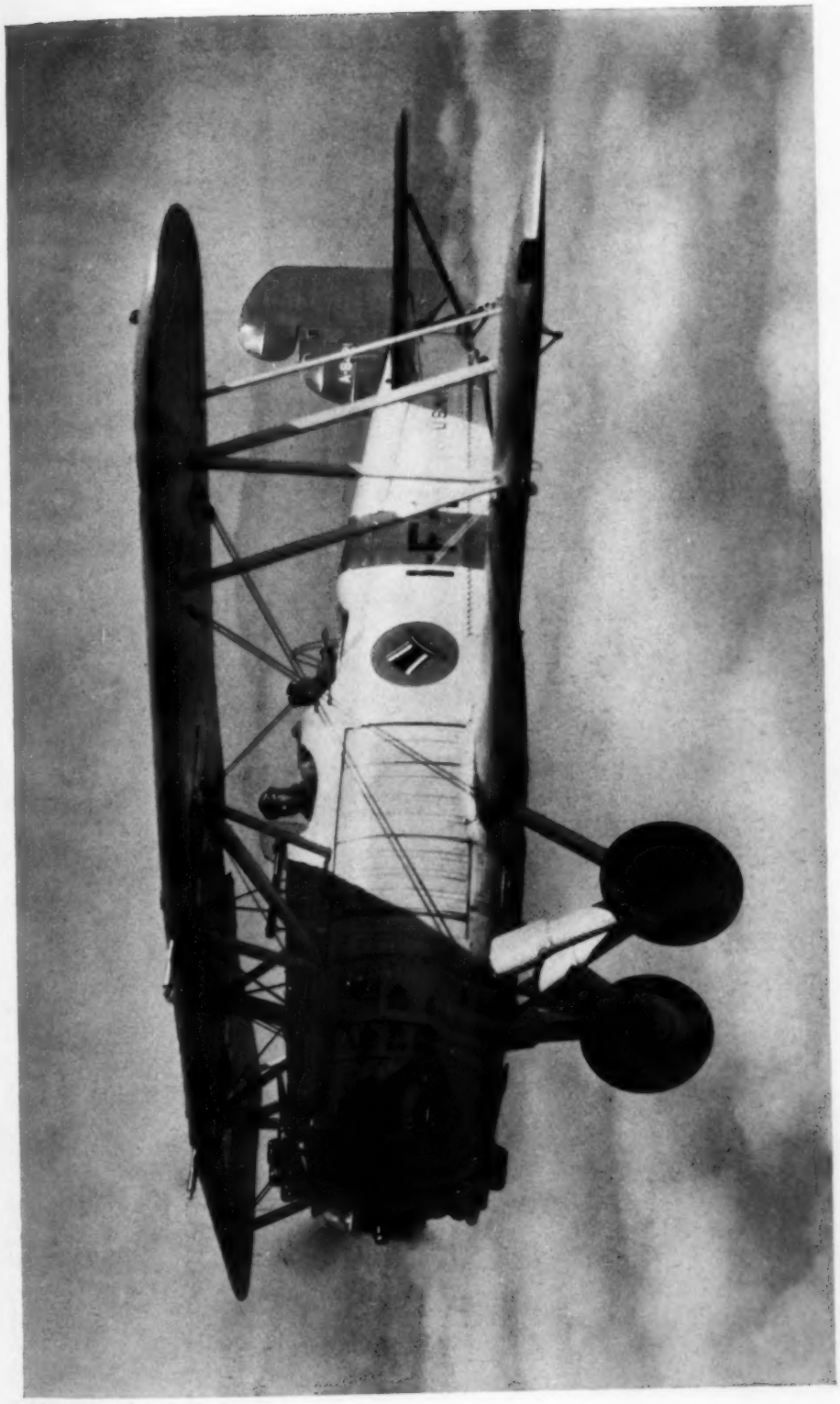
The information service maintained in the Navy Department is invaluable, not only to the Navy, but the public. It renders a great service, not only to the press for current views, but also to any interested person desiring information. However, there should also be such an organization in each district available to furnish facts in regard to the various policies of the Navy Department to any officer or civilian who may have occasion to need them. There should be constant endeavor to keep the Navy before the country.

As an example of what could be accomplished let us take our annual fleet concentration. The public hears little or nothing in regard to the problems being worked out until the ships actually leave the navy yards or bases, at which time accredited correspondents are present. Usually the problems are issued to each commanding officer concerned early in the previous summer. Estimates of the situation are prepared by each side. There is little that must be confidential insofar as the public is concerned. Each commander in chief will come to his own decision and put his plan in effect.

Our Navy Day occurs in October. It would be a good plan if a presentation of the winter problem were broadcast on that day to the nation. The fact that we must conduct our maneuvers in strategic areas, over thousands of square miles of sea, away from the public gaze could be stressed. Such a presentation would arouse the public interest and from year to year the public would look forward to hearing of the Navy's plans.

Then later, but well previous to the actual date of departure, the public interest could be further held if two well-known officers, one representing each side, who are not in either fleet, prepared their own estimate of the situation, decisions, and plans, and gave it as a news item to the press for use in Sunday supplements, etc. If well handled, an able discussion of the coming problem could be spread over a considerable period of time. The actual events which occur, as reported by the correspondents present, would be of greater interest to the public who would then understand more readily the necessity for our carrying out such extended operations.

Future international conferences are not far distant. If the Navy has carefully educated the rising generation it need have little to fear about the outcome of any conference or of the country maintaining a strong navy afterwards. We have many friends anxious to help, but there are also many enemies with large funds available ready to crush us. Let us go to the country frankly and freely, but as naval officers let us go to the nation in the language it understands—the country's, not the Navy's.



F8C-4 PLANE IN FLIGHT

Official Photograph, U. S. Navy

Official Photograph, U. S. Navy

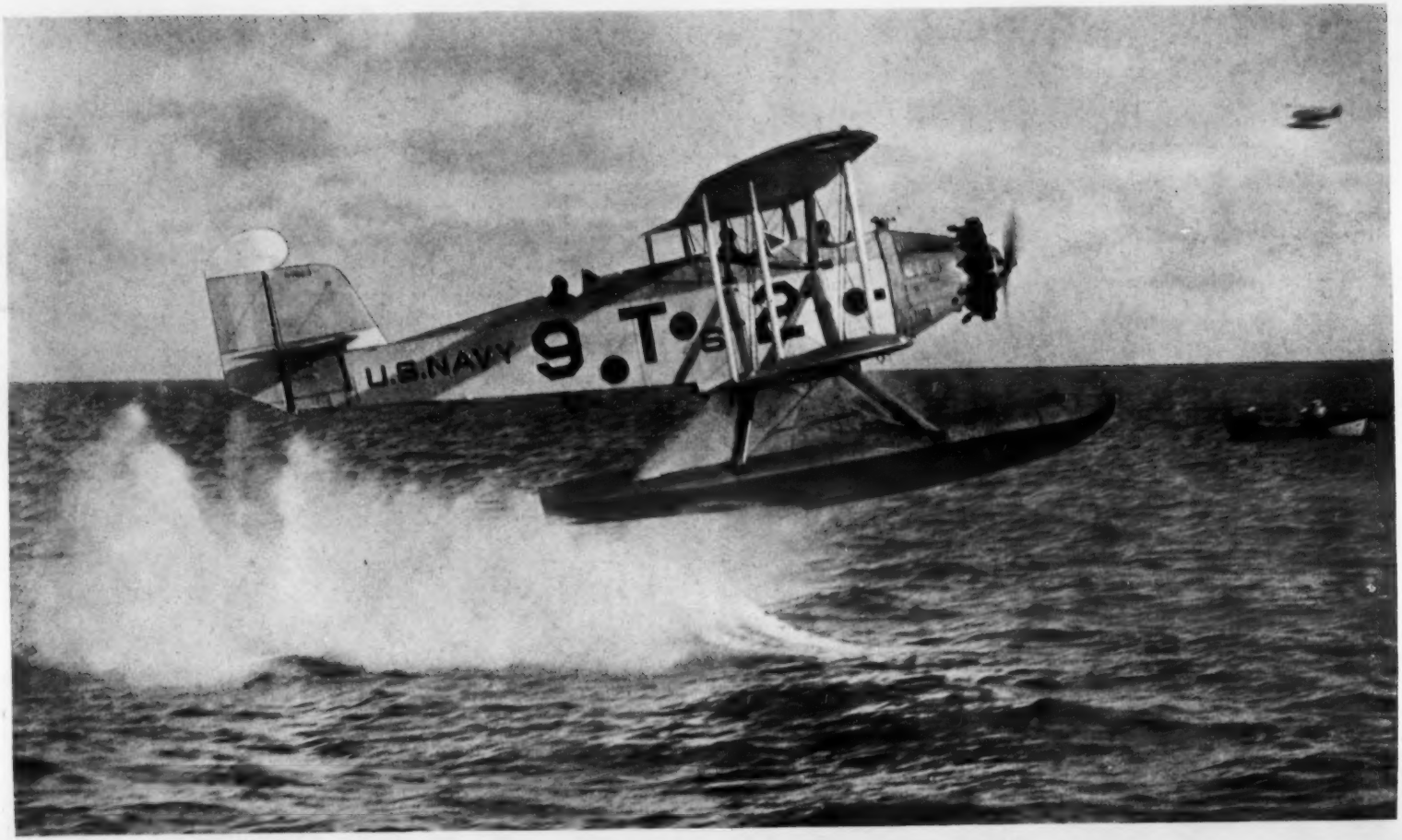
PULLED OFF BY THE PARACHUTE

Official Photograph, U. S. Navy

PULLED OFF BY THE PARACHUTE

Official Photograph, U. S. Navy

XF8C-7 PLANE



Courtesy Bureau of Aëronautics, Navy Department

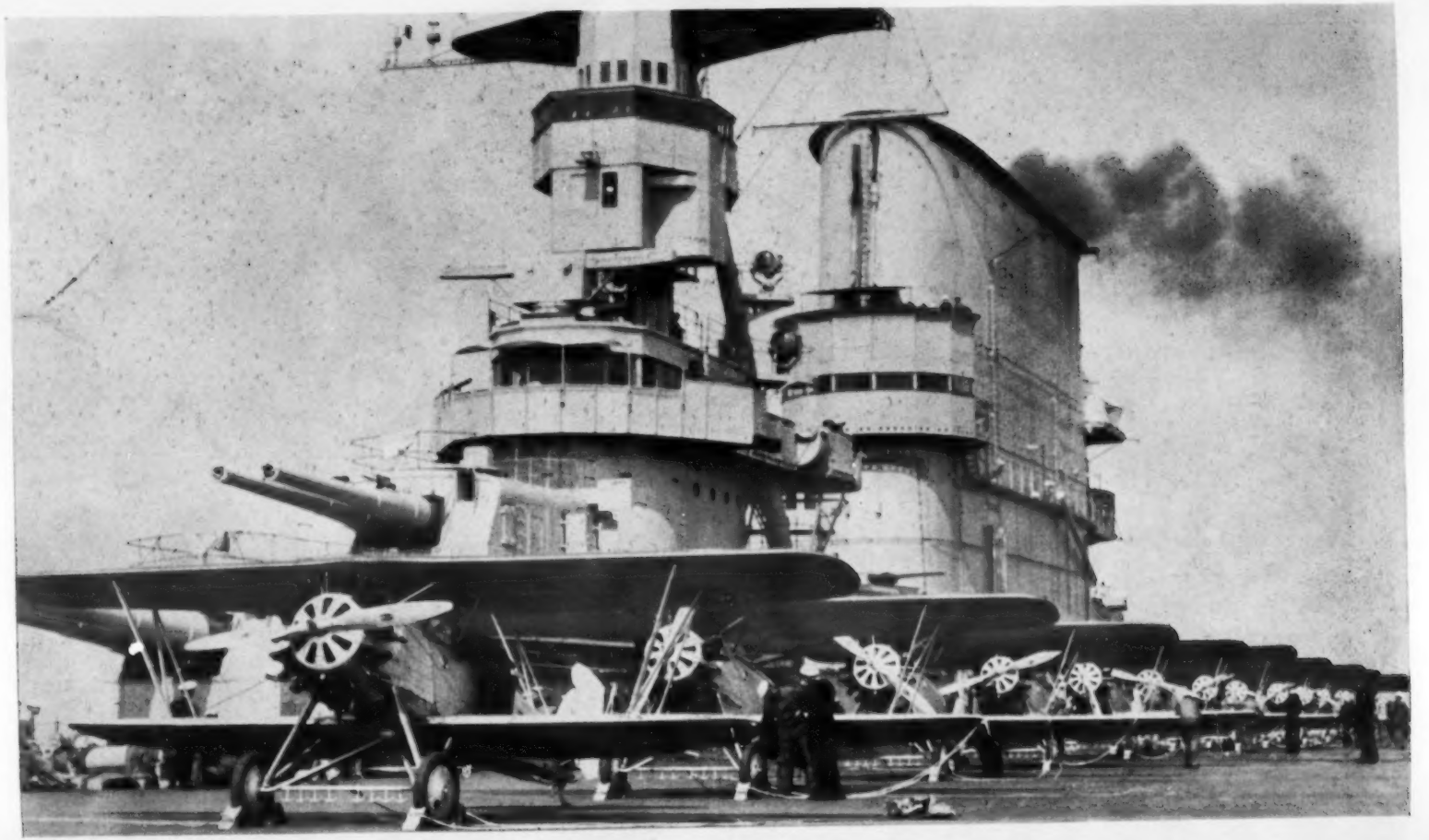
A T4M PLANE DROPPING A TORPEDO

Courtesy Bureau of Aëronautics, Navy Department

A T4M PLANE DROPPING A TORPEDO

Official Photograph, U. S. Navy

THE *LEXINGTON* AT PANAMA

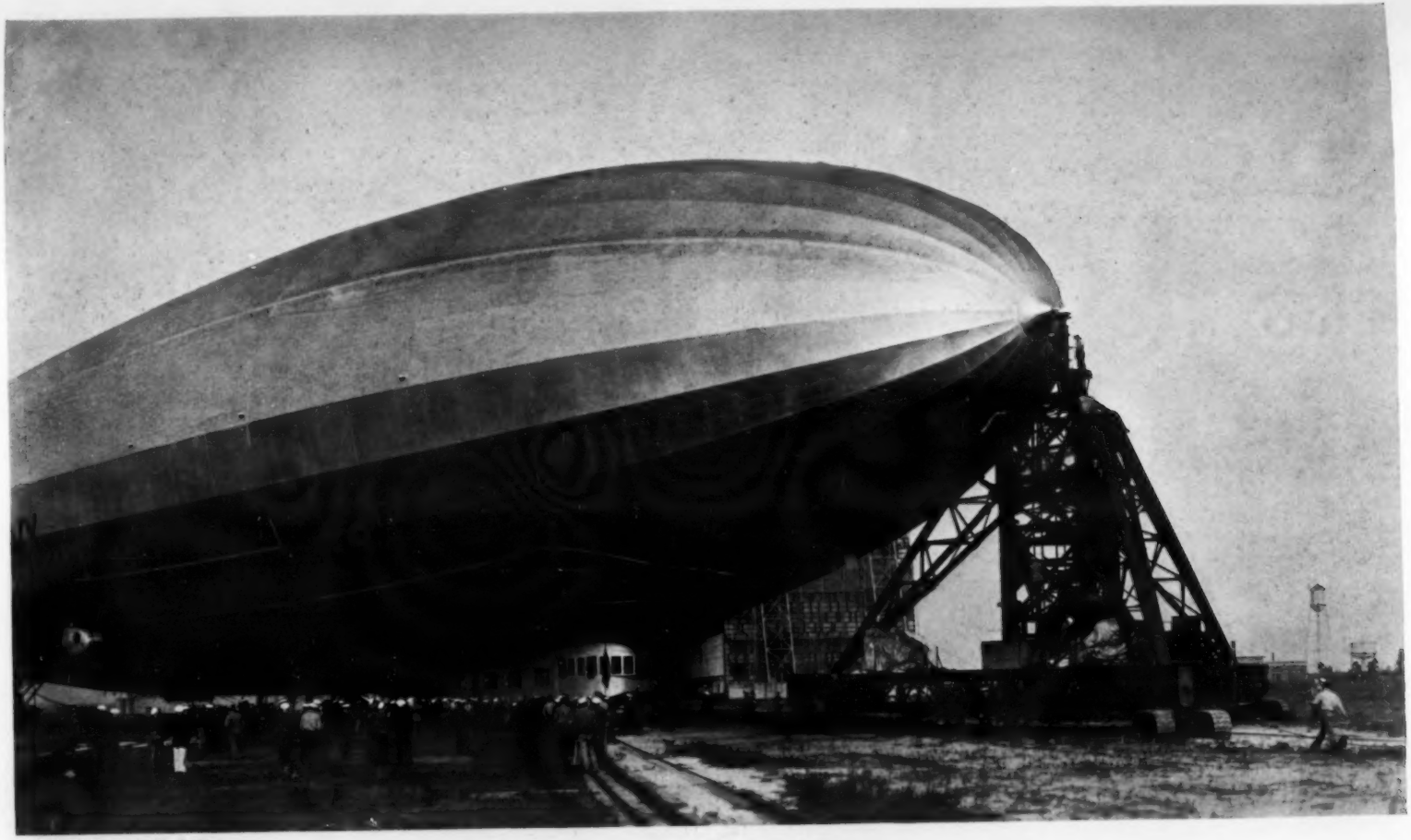


Official Photograph, U. S. Navy

VF2B'S (BOEING FIGHTING PLANES) ON FLIGHT DECK OF THE *SARATOGA*

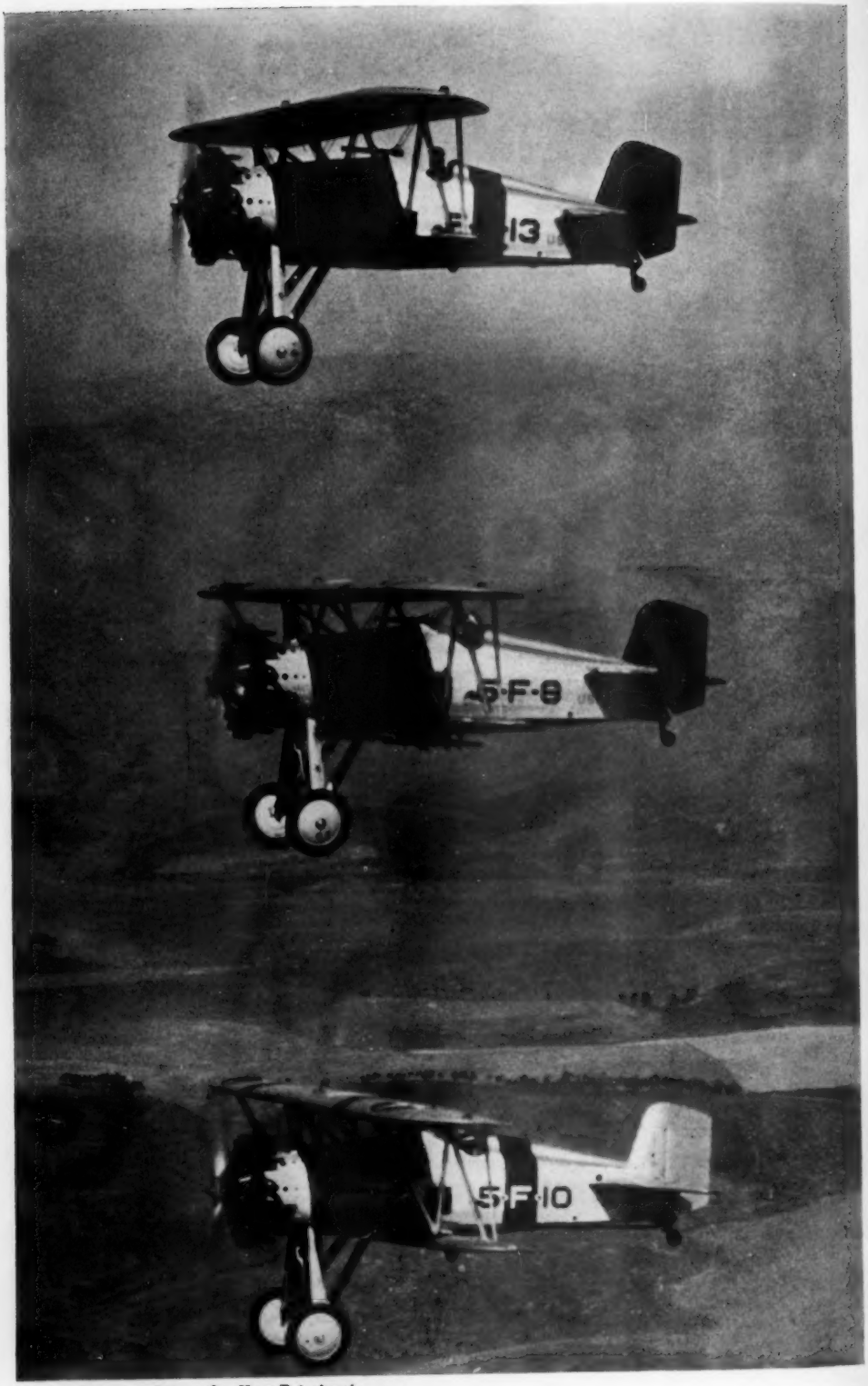
Official Photograph, U. S. Navy

VF2B'S (TOEING FIGHTING PLANES) ON FLIGHT DECK OF THE *SARATOGA*



Official Photograph, U. S. Navy

THE *LOS ANGELES* AT THE MOBILE MAST



Courtesy Bureau of Aeronautics, Navy Department

VF-3'S IN STACK FORMATION

RECENT TECHNICAL DEVELOPMENT OF NAVAL AVIATION

By REAR ADMIRAL W. A. MOFFETT, *U. S. Navy*
Chief of the Bureau of Aëronautics

THE PAST FIVE YEARS have witnessed amazing progress in the technical development of naval aviation. This progress has touched all relative fields and there is no indication that the end is in sight. Many very interesting transitions have taken place during this period, the most notable of which are the passing from water-cooled to air-cooled engines and the perfection of the latter in practically all power ranges; the elimination of wooden structures, and the advent of metal; the use of the metal propeller as a replacement for the wooden propeller; the perfection of the catapult for launching planes from ships; the remarkable improvement in performance of naval airplanes; and the decided increase in size of naval airships. These are the high lights of the development during this five-year period.

One of the most interesting transitions which has taken place recently in naval aviation has been the perfection of the air-cooled engine in all power ranges from a modest beginning of one satisfactory air-cooled power plant developing approximately 200 hp. There are now in production and in service proved units covering the complete range from 150 hp. to 600 hp. Although not losing touch with water-cooled power-plant development, the Navy in the interest of lighter and smaller planes for compact storage aboard ship has been forced to the adoption of the air-cooled engine as standard. It has vigorously sponsored the development of this type and the soundness of the Navy's policy in this regard is proved by the almost universal adoption of air-cooled engines for commercial planes, and the increasing application to military types in other organizations. The part which the Navy has played in the development of the air-cooled engine has not been the part of a passive purchaser, but has been an active one. Naval officers and engineers have been directly responsible by their study and suggestions for many of the improvements which have taken place.

Today power under sea-level conditions is not alone sufficient for naval aircraft. The battle altitude has increased 100 per cent in the past five years because of the increase in aircraft ceilings. Power and speed at high altitudes are therefore required nowadays for combat, and the fighting pilot obviously wants the maximum performance at these high altitudes. To accomplish this, superchargers, variable pitched propellers, manifold pressure regulators, etc., have been developed, each of which is an engineering project of considerable magnitude and complexity in itself.

The recent adoption of the dive-bomber type of naval aircraft has likewise added additional power-plant requirements which have been successfully met. The engine and installation for such planes must be capable of operating satisfactorily in a vertical attitude and to withstand the increased r.p.m. from acceleration in a dive. Diving operations result in a terrific beating of the engine. It is only within recent years that engines have been built which can withstand such treatment. The average speed in a dive is about 2,500 to 2,800 r.p.m.

The passing of the wooden propeller with its inherent defects of susceptibility

to climatic conditions, erosion by the elements, and its non-variable blade setting has also taken place during the past five years. The metal propeller with its adjustable blade feature has come into use as standard equipment of naval air units. The present standard detachable-blade aluminum-alloy type of propeller has a wide range of usefulness as its pitch may be adjusted on the ground and set to give best performance. As a result, a given propeller design is often suitable for use on several types of airplanes.

The Navy is continually experimenting with new propeller developments. Hollow-steel propellers have recently been flight tested and found to compare favorably with the aluminum-alloy propeller in both weight and performance. These propellers when whirl tested, demonstrated superior strength in comparison with present service types. An experimental order of magnesium propellers has also been procured and, if the magnesium propeller proves suitable and sufficiently corrosion resistant for service use, a considerable saving in weight will be effected. Similar experimental projects for the testing and development of controllable pitch propellers have been undertaken.

Another outstanding feature of the recent progress in naval aviation has been the replacement of wood by metal in the construction of aircraft. It has been realized for years that wood for structural parts for aircraft is in a measure unreliable. The unknown qualities which affect its strength are always present. Wooden members used in seaplane construction gain weight by absorbing moisture, and suitable woods have been more and more difficult to obtain. Hence there has been a definite movement toward metal construction of naval aircraft. The trend was first to steel, then to a combination of steel and duralumin and the present practice is to use light aluminum alloys entirely. These insure more dependable structures, give greater strength, and are lighter.

This substitution of metal members for the corresponding wood members, has involved an improved method of design and construction of such far-reaching effects that the modern aircraft structure bears very little resemblance to its wooden predecessor of five years ago. Fuselages have evolved from stick and wire to welded and built-up tubular, to so-called monocoque. Hulls have changed from the wood planked truss construction adapted from fuselages to the monocoque type. Wings have developed from the solid routed beam and wood rib assembly, to the built-up wood beam, to the metal beam and rib, to the stressed skin wing. Likewise, control surfaces have changed from wood to metal, and landing gear from bunge cord absorbers and tail skids to oleo absorbers, tail wheels, and low-pressure tires.

These developments which have caused such a great change in the airplane structure have made necessary a radical change in design calculations and methods. New basic design data had to be accumulated and, in order not to handicap this structural evolution, the need for this data had to be foreseen. It has been the policy of the Bureau of Aëronautics to encourage and finance basic structural research by naval establishments such as the Naval Aircraft Factory, and by other government agencies, such as the Bureau of Standards and the National Advisory Committee for Aëronautics. Private contractors have also been encouraged along this line by the placing of contracts for experimental airplanes and structural parts.

Airplane structures must have, first, the requisite strength, and second, the minimum weight. In order to satisfy these requirements, the strength while sufficient, must not be excessive. The amount of strength required is a function of the loads to be withstood. The Bureau of Aëronautics has therefore expended a great deal of thought and effort recently in determining

more exactly the loads which naval airplanes are required to withstand both during the extremely severe maneuvers which are demanded by naval tactics and in landing on the decks of carriers in a restricted area. This research conducted by the bureau has made possible the development and application of more precise methods of structural analysis with a view to providing the increased strength to withstand the severity of present-day operating requirements of naval aircraft without a corresponding increase in their weight.

The research work in the Navy's wind tunnel and model basin at the Washington Navy Yard has yielded valuable returns by way of improvement in the water characteristics of both hulls and floats, improved wing sections, and reduction of parasite drag, and has generally enlarged the fund of scientific knowledge in aërodynamics. Recent tests have covered such subjects as the effect of basic form and of modifications thereof on the drag of struts, the effect of fairings and location on nacelle interference, the drag of several series of typical airplane bodies and floats, and the effectiveness of various types of radiators and radiator cowlings. Tests have also been made on a number of airfoil models fitted with various kinds of slots and flaps. Another investigation covered the effects of various general types of center section cut-outs on airfoil models. Studies of a somewhat similar nature cover the effects of various types of fairings on wing tips and control surfaces. An investigation now under way is concerned with the proper proportions between the elevator area and the stabilizer area for typical designs. A new 6-foot 4-inch diameter open-throat modern wind tunnel has just been completed to replace the present 4 by 4-foot tunnel which is too small for the work required. With the greater capacity of the new wind tunnel, it will be possible to complete tests much faster than at present.

The Navy increased its aëronautical research facilities a few years ago by the establishment of an aëronautical engine laboratory at the Philadelphia Navy Yard and a flight test section at the Anacostia Air Station. These research units permit the Navy to conduct tests on all kinds of planes, engines, and equipment, and gain first-hand information as to their characteristics. The rapid progress in the art of flying within the past few years has placed a tremendous load on all the Navy's research activities, as new ideas are presented for testing and investigation in much greater number than heretofore.

An important tendency in connection with the improvement in performance of naval aircraft is the return from the multi-purpose to the single-purpose plane. The only advantage of the former is to reduce somewhat the total number of airplanes and spares required. This, however, is more than outweighed by the reduction in performance which is unavoidable in multi-purpose designs, and by the poor disposition of crew and material, even under best compromise conditions. The present tendency is to place the crew and equipment in the best arrangement for a single purpose and to design the airplane around this arrangement. The designer attempts to secure the smallest and lightest airplane possible to carry the given load and fulfill a given mission.

Certain types of naval aircraft used by the fleet are subject to restrictions on maximum span, which prevent the immediate adoption of the high aspect ratios now used extensively on commercial monoplanes. This handicap is being met by better wing arrangements, better wing sections, and reduction of drag. In those types where the restrictions are not absolute, as with fighter and observation planes, and flying boats, there is a pronounced tendency to go to the monoplane arrangement.

The past year has broadened the field considerably in amphibian development.

Several new naval types completely house the wheels in the retracted position and at the same time have more reliable operating mechanism. This was achieved at a great weight reduction over those now in service use. These latest retractable units hold forth promising possibilities for use in types other than amphibian.

Parallel to the development of single-purpose airplanes, the growth of naval radio has been along similar lines. There are now in use, or being developed, distinct equipment for the various types of airplanes, namely, patrol, scouting, observation, etc. Radio sets have been greatly increased in power without appreciable increase in weight. The engine-driven generator is supplanting the wind-driven unit. Ignition shielding has been adopted to secure the best radio performance. To aid naval airplanes, which under certain conditions fly several hundred miles or more over the ocean under conditions of poor visibility, in the return to their ship, radio-compasses or homing devices have been developed by the Navy. These homing devices installed on naval airplanes guide the lost or confused pilot so accurately that unless he stops beforehand, he inevitably runs down the antenna from which the homing signals are being transmitted. The instances that these homing devices have been of service have many times repaid the Navy's efforts in developing them.

The steady development of instruments for naval aircraft has been largely along lines of standardization, reduction in size and weight, and methods of test. Improvements consist in smaller and more reliable equipment and better installations, particularly as regards more convenient grouping of the instruments and the indirect lighting of panels. Notable improvements have also been made in equipment for blind flying and navigation. Interest in gyroscopic instruments and their effect on the simplification of instrument flying has has been revived by the introduction of a new type of artificial horizon and direction indicator. At the present time, the Bureau of Aëronautics with the coöperation of the Sperry Gyroscope Company, has under development a gyrocompass for use in aircraft. The development of a satisfactory gyrocompass will eliminate the present difficulties encountered with magnetic compasses due to large magnetic masses, such as engines, near the compass.

The details of armament equipment are for the most part confidential, but steady progress has been made during the past five years in perfecting armament material such as bombs, torpedoes, machine guns, sights, bomb racks, and the many accessories which are necessary to insure the operation of such major items. Provision for the carrying of armament material has been especially emphasized recently. During the World War, and for a number of years afterward, airplanes were designed and built primarily as mere flying machines and military equipment for either offense or defense was generally hung on as an afterthought. Today a naval airplane when compared with a commercial airplane of similar size shows wide variations. One will find that machine guns are carefully lodged in the wings or fuselage of present-day naval airplanes, and not simply secured in place after the plane has been completed. Bomb racks in many instances are similarly treated. Protection from the wind blast for the rear gunner is much more adequately supplied than formerly. Instead of a bomber standing in the wind blast in the bow of an airplane and trying to operate his sight while bracing himself against an 80-mile an hour breeze, as was the case five years ago, he is comfortably seated or kneeling behind a non-shatterable plate glass window and can operate his bomb rack as easily as he rings a doorbell instead of pulling a toggle with all his strength.

Of the distinctly naval equipment developed by the Bureau of Aëronautics in

the recent past, none is more important than the emergency flotation gear. Primarily, its purpose is the protection of personnel; secondarily, the preservation of material. Since its adoption, many lives have been saved, and in addition the value of airplanes and equipment salvaged has been a good percentage of the total cost of the flotation gear. In naval maneuvers, landplane fighters, scouts, bombers, and torpedo planes are sent from their aircraft carriers on missions which take them far over the water. In case of a forced landing, by means of the emergency flotation gear, the airplane is kept afloat in a horizontal position thereby furnishing a reasonably stable floating platform, usually the upper wing. This serves as a refuge for the crew and as a large, easily identified object to aid the searching parties.

The gear itself consists of a carbon dioxide cylinder secured in the fuselage, containing the proper charge. Fastened to its head is a special type of valve which, when the pilot pulls the release, allows the liquid to flow through copper tubing to a small piston valve adjacent to each bag. The latter valve first releases the bag from its compartment, and then directs the flow for inflation. In the smaller types of airplanes, two bags are used, usually housed in a flush, covered compartment in the upper wing. In the large torpedo and bombing planes, a three-bag installation is employed, two being housed in containers inside of the fuselage cowling forward and the third inside of the rear of the fuselage. It may be interesting to know that the entire emergency flotation gear for a 4,000-pound airplane weighs only 60 pounds, and that from the pull of the release to full inflation of the bag requires only 40 seconds.

The Bureau of Aëronautics now has under development a valve for this gear weighing about two pounds which will operate automatically and thus will save the lives of personnel in crashes at sea which are of sufficient violence to stun the crew, but not completely to demolish the airplane. This valve, in addition, incorporates the temperature release, the indicating device, and the mechanical operation of the present valve. It is actuated by the pressure due to a hydrostatic head of about eighteen inches of water acting upon a diaphragm. When thoroughly tested and approved, this valve will replace the manual ones now in service.

The operation of catapults for the launching of planes from ships has been changed during the past five years from one requiring the most careful supervision of highly trained personnel, to an everyday routine procedure aboard all the battleships and cruisers of the fleet. There has been a steady increase in capacity, reliability, and simplicity of catapult operations and further development of this aviation apparatus is going ahead at a rapid pace.

On the carriers, effort has been concentrated on speeding up operations, including take-offs, landings, and faster handling of planes both on deck and below. Brakes and tail wheels are now standard equipment for all carrier planes. The tail wheels are unique in that they are full swiveling, and also lockable in the fore-and-aft position. Both of these factors are necessary in different phases of carrier activities. Torpedo planes attached to carriers now have folding wings, and this feature may be extended to other types. Moreover, continual changes and improvements are being made in the carrier's arresting gear, all for the same purpose.

The recent high rate of progress in the technical development of naval aircraft is well evidenced by the remarkable improvement in their performance. From low-powered aircraft with limited load factors and performance, a steady progression has been made to the powerful, heavily armed fighting units that are at present launched from catapults from the decks of carriers.

As an example, five years ago, the fighting plane made a high speed of 122 miles per hour, and had a ceiling of 13,500 feet; today, one of the fighting class has a high speed of 175 miles per hour, and has a service ceiling of over 27,000 feet. Similar progress has been made in all the various types which go to make up our naval air forces.

In its lighter-than-air work, the Navy has been a pioneer. The facilities which now exist for the construction of rigid airships in this country and the engineering knowledge on this subject which is now available, have been due entirely to the Navy's realization of the possibilities of lighter-than-air craft and its activities in this field. Five years ago, the Navy had the only rigid airship then in operation throughout the world, the U.S.S. *Los Angeles*. This airship is still in active operation, and a recent inspection indicated that its material condition will permit from two to four years' more service. Another Navy airship, the U.S.S. *Akron*, is under construction and almost completed. It will be placed in commission within the next few months, and will, when completed, be the largest in the world, with a volume of 6,500,000 cubic feet. A sister-ship of the U.S.S. *Akron*, the *ZRS-5*, is under contract at the present time. These two new airships will have a high speed of 73 knots, and a cruising radius of 183 hours at 50 knots. They will be used for long distance scouting and each will carry five or more high performance fighting planes to add to their protection.

Important lighter-than-air development and training work has been carried on during the past five years utilizing the *Los Angeles* and two nonrigid airships. Extensive full flight research has shed light on airship problems that were hitherto somewhat obscure. Water recovery apparatus, an important adjunct to helium-filled airships, has been improved. Materials entering into the construction of airships have been developed and perfected. Handling methods have been tried out and the present mobile mooring mast evolved which permits a large reduction of the man power formerly required to handle airships. Promising steps toward the development of a satisfactory oil-burning engine for airships have been taken, and there is every indication that a suitable engine of this type will be available in the near future.

One of the greatest objections to dirigibles was the danger caused by the use of hydrogen gas. When the Navy first desired to use helium as a substitute, this material was so rare and the methods of production so little known, that it could be had only in small quantities, and at prohibitive expense. After extensive studies, the Navy built and operated at Fort Worth, Texas, a plant where large scale production at reasonable cost became an accomplished fact. Today this production is being handled by the Bureau of Mines, and helium is also being produced by private manufacturers.

In conclusion, it may be said that this technical development of naval aviation has been invaluable not only to the Navy, but also to the aëronautical industry as well. The studies, research work, and experimentation which the Navy has made for its own use, have in almost all cases been held non-confidential and have been published for the benefit of the industry. Naval aviation is in a healthy state of development at the present time and it is ready to do its part in any emergency.

THE MERCHANT NAVAL RESERVE

By LIEUTENANT JAMES HANNA, *U. S. Naval Reserve*

THE PEACE-TIME ACTIVITIES of the Navy are based upon the ever increasing necessity of training the personnel. The ships and men must be, theoretically at least, able to begin hostilities at any time and place; which means that the men must be trained to the precision of automatons, and the officers to animated textbooks. For, speaking in general, the day of individuality in naval warfare is dead, and its place is taken by mass handling of applied science—so much so that it is becoming more difficult, year by year, for an officer to know all that he should, and even to keep up with his profession. The textbooks themselves are often out of date before they are off the press. It might be said that an officer goes through his career today hitting only the high spots, and the fantastic possibility looms of the completion of the cycle whereby naval warfare will return the officer to his status of a thousand years ago, when it was not necessary for him to know anything, except to be an officer.

Here is an absurd probability, for our age is chained to the rowing benches of system, and matters maritime must pull its own oar. It is the only way that it may keep afloat and, rightly or wrongly, we must fall into line. So the tendency today is toward more officers, which lightens the burden on the group as a whole, and specialization which entails a perennial shortage of officers.

During ordinary times of peace this is a question of organization combined with intelligent planning and a modicum of Congress baiting, but when war is declared we must have the men, and for this we have the Naval Reserve. There are several classes of reserves, depending for their utility upon the amount of knowledge and training they possess. This is the only true standard for a reserve anywhere. It is equally true of the merchant naval reserve; but with this class it is apparent that a satisfactory solution has not been reached. It is composed entirely of officers of the merchant service, grading from ensign to and including lieutenant commander, according to the berth held at the time of enrollment; and it is separated into two distinct branches, deck and engineer.

Now it is a commonly held theory that these men as a class are the best possible material for immediate conversion into naval officers in the event of war. This is indeed so in the case of the engineer branch. As far as naval purposes are concerned the engineers stand in no great need of training. All marine engineering is fundamentally the same and, should the need arise, the engineers from our merchantmen could be assigned to active duty at once, thereby releasing numbers of commissioned, warrant, and chief petty officers for service in the battle line. But the same reasoning does not hold true in the seaman branch, and it is to this branch that the ensuing observations appertain.

Navigation of late years has become largely a stereotyped affair. The march of science and invention has so mechanized this one-time art that one may push an imaginary lever and read the answer in the upper left-hand corner. It doesn't matter greatly anyway. A vessel equipped with modern inventions—to name a few: the gyrocompass and pilot, fathometer, radio direction finder, revolution-mile indicator —could be navigated about as well with-

out celestial observations as with them. In other respects, the experience of merchantmen tends toward matters with which the Navy has little to do.

The master's time is occupied with commercial ship's business, expense reduction, and the constant effort to shorten the time of his ship in port; the last being a sort of contest between himself, prodded on by the company, on one side, and the mates, engineers, seamen, stevedores, agents, and port officials on the other. The mates are occupied with the care of cargo and the appearance of the vessel. None of this is of particular value in time of war, and as a background for naval training is almost worthless.

It is not very probable that the officers of the merchant reserve would be assigned to duty with the battle fleet in the event of hostilities. As a class they would be more or less useless for a long time, much longer in fact than a group of young, technically educated men. The knowledge required of any naval officer in gunnery, fire control, communications, landing force, and modern warfare in general would find the merchant officer totally unprepared. Some might qualify for first lieutenant, but even this could be argued, due to the vast difference between the routine of the two services. Moreover, it would be impractical to assign lieutenants and lieutenant commanders to billets of junior officers under instruction.

It is also unlikely that another war would create the need of large numbers of unarmed cargo vessels for naval purposes, unless it be that the Navy contemplates taking over the private foreign trade of the nation, in which case international law must be amended and all naval theory of warfare changed. The probabilities are that the best of our passenger and intermediate ships would be taken over, and that the number of naval auxiliaries of all classes would be increased; but the merchant officer does not fit here either. It is true that he would be more at home than on a battleship.

For the mission of a naval auxiliary of any class whatsoever is to carry on at its assigned task to completion, if possible, no matter what the circumstances; and this implies a high degree of discipline, considerable training, capacity for assimilation of punishment, and ability for effective defense. This third requisite is primarily a matter of ship construction, but the other three depend entirely upon the personnel. This may be worse but is certainly never better than its officer section. Reducing the situation to a few words—the effectiveness of a former merchant ship to the Navy in time of war may be said to be composed of one part good construction, with careful attention to detail and regard for as many as possible belligerent contingencies, and three parts officers.

It is not denied that the officers of the present reserve could move the ships against the enemy, even a strong one. The United States is a nation of vast resources, and could perhaps afford heavy losses in ships; but this is scarcely intelligent planning. It would be possible, of course, to have two or three merchant deck officers in the vessel's complement, for assignment to stations of minor importance, requiring little knowledge at general quarters. But this would mean that the vessel would go into action short of officers, and does not appear to be a very good solution. Moreover, if he could be dispensed with during battle, it seems a reasonable argument that he could be dispensed with entirely at all other times.

It is occasionally argued that hostilities against a weaker nation would render unlikely enemy action against the auxiliaries, in which case any sort of officers would do. But we would scarcely need reserves against a nation too weak to possess at least submarines and aëroplanes. The Navy may have had any number of reasons for its enrollment drive of two years

ago among merchant officers, but fear of Liberian steel was not one of them.

There are some 2,000 officers in this reserve, and it would appear bad strategy to place them either in the battle fleet or the active auxiliaries. There remain the inactive auxiliaries, harbor craft, and shore duty. First, inactive auxiliaries are not easily identified in these days of science and *guerra al cuchillo*. It would be hard to imagine a more inactive vessel than a lightship, and yet Diamond Shoal was torpedoed during the last war. Harbor craft. Well, tugboats require tugboat men, which the most of us are not; and anything else in the harbors would scarcely require officers at all. As to shore duty, the larger percentage of it demands naval men, and the non-maritime part could be better served by experts from civilian life. The only place where these officers might fit in with a good chance for success would be in an ordinary tramp, noncombatant and chartered by the Navy.

Having thus neatly chased our cat home again where it belongs, we pause for a pardonable bit of hand rubbing and are surprised almost instantly by its reappearance, pushed from a cellar window. Merchant ships cannot use these officers either, in time of war.

Nothing better having been evolved to take its place, it is almost certain that the armed-guard system would be revived for noncombatant ships, Navy chartered or otherwise. Comment on this system for naval readers is a waste of time. It is only necessary to point out that under the armed-guard system the petty officer of the gun crew took his orders from his superior officers ashore only. In the event of an attack his authority, for command of the vessel or anything else, was unlimited, or to be exact, limited only by his judgment—a very necessary arrangement, but impossible if the officers aboard were actually his superiors. The Navy would be, therefore, placed in the peculiar situation of having to hunt for men who were not members of the reserve to man its ships.

There is much excellent officer material in the merchant service—men who have had naval training, men who are particularly adaptable to naval training, and men who are natural officers; but they are not by any means in the majority, and it would not be feasible to weed out the unfit after the call to duty in war time. This would involve the costly and time-consuming method of trial and error, and it would be unfair to "chuck a man out on his ear" after he had purchased his outfit and owed a mess bill. Far better to pick and choose beforehand, but in this the Navy Department is handicapped by a total lack of knowledge concerning the ability of the men of the merchant reserve, the present criterion—the only one possible—being length of service in merchant ships. This is on its face a poor one for, speaking in general, any third mate, ensign, would be better equipped for his naval duties than any master, lieutenant commander. At least he could cause less damage.

Naval warfare used to be a rough and tumble business. You "hit the enemy in the face with a holystone"—*vide* Navy Department records—"cursing him loudly the while," and a merchant officer with leather lungs and a liking for a scrap could lead his men over the nettings about as well as anyone else; but that sort of thing passed away with the old navy, however much we may regret it. There is no room in naval warfare today for officers whom you can hear up-wind for a mile. We have voice tubes and telephones. Men cannot be efficiently commanded in routine work by officers who lack even fundamental knowledge of their duties, and successful defense against an energetic enemy under like conditions would be a miracle, nothing less.

The answer to all of this is quite obvious—training; but the answer to that is less clear. A seaman's time ashore is limited, and he would not care to spend an

enforced vacation on a battleship any more than a naval officer would like to cruise about in a tramp. We must remember always that in all save a very few companies vacations are strictly without pay. In addition, it would not be possible to give group training in any event, as few officers could guarantee to be at any designated place at a specified time. And finally he would not do it anyway for he does not get paid. Add to this that there is no particular reason why the companies should enroll their ships in the reserve, and we have a question to break up a peace conference.

The men want a month's pay per year. That was the bait that induced 90 per cent of the signatures in 1928. And it is not exactly a secret that the companies want something out of it also, but at the present writing the eagle has maintained a stony silence. Reasons, arguments, and excuses have been plethoric; but one of the most likely reasons—although it must be admitted a seldom-mentioned one—is that the Navy already has a rather firm grasp on those ships which it actually desires. As for the men, their present retainer pay closely approximates their naval value.

Of course the stymie can be broken, but only through a training program of some sort; and as no one has made public an attempt at a solution, the following is offered as a target. If the Navy Department really wanted it, and fought for it, there is a very good chance that it could get a month's pay a year for the merchant reserves. It would not be difficult for the men to get one month's vacation at least every two years.

(a) Have each officer report to his own or any other navy yard for a period of two weeks' training every two years.

(b) Detail a regular naval officer to every yard to handle this department, with whatever assistants he might require for instructional purposes.

(c) Have each officer report once every year to his navy yard for the purpose of passing a brief written examination suitable to his grade.

(d) Have the pay of each officer conditional both upon his appearance for this examination and his two weeks' training.

(e) Have the two weeks' training period optional for engineer officers.

(f) Make the training period fourteen consecutive days, but allow the officer to report in for same on any date.

(g) Allow any officer found to be reasonably proficient to make a cruise with the fleet or aboard an auxiliary, if he so desires and has the time, for a period of three months in any three years, at regular pay.

(h) Allow all officers access to any non-confidential books of the Navy, and encourage study of the regulations, ship and gun drills, pay and supply instructions, etc.

It is realized that these suggestions leak badly. A navy yard is a poor place to train sea fighters. The men could not, in the nature of things, learn very much in so short a period. They would likely forget the most of anything that they did succeed in learning between training periods. Worse than all, the vitally important training in target practice and spotting would not be possible. Nevertheless, a program such as this would give personal contact with the officers of the merchant reserve, and allow approximate measurement of the capability of each member.

There is only one reasonable argument against this. Many men would not take the training or appear for the examinations even if paid to do so. Countering this it may be said that there would be no necessity of actually dropping them from the rolls; they simply would get no pay, and would remain in exactly the same status that they now are. And if this arrangement were not possible, much better to drop them and take the loss. A small useful reserve is a more valuable asset to a navy and a nation than a large one on paper.

As to what the various companies should get out of this for enrolling their ships I

cannot pretend to say. This is no treatise on economics; but there are a number of measures that might be taken without going to Congress with a bold demand for cash. Tonnage dues might be reduced on naval reserve ships, or favorable income tax consideration might be made, or any number of similar suggestions adopted. A most eminently practicable one would be the remission from naval reserve vessels of compulsory pilotage while in home waters, providing that one of her officers be a regularly licensed pilot for the port to be entered. This last alone is calculated to arouse a great deal of latent patriotism in shipowners.

This article should not be read as an indictment of merchant officers as such, far from it. I am one, and I say it with pride. Speaking in general, our merchantmen are quite competent at their profession, as the records show. What I do say is that large numbers of them would make but indifferent coxswains in the navy; but this remark would apply with equal force to a group of highly successful lawyers, merchants, college professors, or bank presidents.

SOME NAVAL ECCENTRICITIES

By FLETCHER PRATT

ECCENTRICITY IS A FRUIT that does not grow on every tree. To be a genuine eccentric a man must have learned that his own queer way of doing things brings him out right side up more often than not; and he must be quite free from the inhibitions which keep most people from doing exactly as they would like to do. The difference may be expressed by saying that the average man has an uncontrollable impulse to throw at the waiter's head the bad egg he has been brought for breakfast, but he somehow manages to control it. The eccentric throws the egg.

Now there exists a general opinion that the combination of characters for eccentricity is found at its perfect best in just two classes of men—artists and naval officers. Whenever a novelist, from Tobias Smollett down to Robert Louis Stevenson, has wanted an eccentric character, he has drawn either a painter or a sea captain, and usually the latter. It is the object of this paper to examine a few actual and non-fictional naval eccentrics, in an effort to find out whether Billy Bones and Commodore Trunnion are really typical naval men.

Let us start with the most eccentric of all—Captain Teach (Blackbeard, the pirate), an officer in no navy but his own, yet so perfect a case that he merits special consideration. Why did he go in for the elaborate make-up; the enormous three-pronged beard (so like that of Admiral von Tirpitz in cut!) braided at the ends and tied with red ribbon; the heavy, gold earrings; the slouch hat, ornamented with a row of slow matches stuck under the brim and projecting over his face; the bandoleer with five pistols stuck in it and the belt with the frieze of knives all the way round? I maintain that he went in for them because it was an almost physical necessity of existence. They gave him the ferocious appearance which was so valuable in his business. The pirates of his day were a lot of hard cases; like the racketeers of our own time they imagined a soft-spoken leader must be a weakling. Captain Vane and Stede Bonnet, two of the most successful and intelligent pirate leaders, were deposed and marooned by their crews, simply for lack of the proper "pirate quality."

Blackbeard was a more satisfactory ideal. He claimed to be the only son of the Devil, and encouraged the idea by ordering his crew below from time to time, shutting down all the hatches and lighting fires of brimstone at various places in the hold of the ship. The first man to break out of the sulphurous reek was degraded to the post of scullion, and Blackbeard himself was always the last to leave the stinking ship. He was also in the habit of inviting members of his gang to dine with him, and, at least once in the course of a meal, of drawing two of the pistols from his bandoleer and firing them off under the table, with resultant damage to the collection of feet found there.

Now Blackbeard was either an extremely intelligent man or one of those intuitive geniuses who do the right thing by inspiration. The total result of all this foolishness was that he became the beau ideal of a pirate leader; up to the time Lieutenant Maynard brought him to book his crew was constantly on the increase and he never once (unlike all other pirate captains) had a mutiny to deal with. In short, his eccentricity was just the right thing.

The next notable eccentrics come in a pair—Captain Jenkins and Admiral Vernon. It was at the time considered highly unusual of Captain Jenkins to pickle his ears in brine after the commander of the Spanish *guarda-costa*, who caught him smuggling, had cut them off. I fail to see it that way. Captain Jenkins was a simple-hearted man who kept the ears as a souvenir in exactly the same spirit that people talk about their operations and keep removed appendixes in glass jars on the mantelpiece. There are probably dozens like him. His act received undeserved prominence because he fell into the hands of another eccentric of far different character—Admiral Vernon.

Vernon, alone among naval officers, was a boaster, and almost alone among them, a politician. A too indulgent father had yielded to his boyish wishes to be sent to sea, and all his life long Vernon regretted the whim and its results. His ambition (after maturity) was for the life of a country squire and a pack of foxhounds, and all his singularities of conduct may be traced to this cause. At the earliest possible date he abandoned the Navy for Parliament. It was in the reign of Walpole when every talent but Walpole's own was sedulously stifled by a minister so avid of power that he could not spare the least fragment of it. Vernon, unable to make any headway in the House, became more and more flamboyant in his speeches in opposition, and when a naval friend told him about Captain Jenkins and his ears, he saw a great opportunity. He had Jenkins carefully coached, and brought to the bar of the House.

"And what did you do when they cut off your ears, Captain Jenkins?"

"I commended my soul to God and my cause to my country!" And plunk! went two pickled ears on the speaker's desk.

It was a battle cry. Vernon followed with a speech full of nonsense, in which he laid the evils of the country to Walpole, Spain, and the curse of drink (he had strong views on temperance also) and offered to take Porto Bello, the great Spanish stronghold in America, with only six ships. Walpole saw a heaven-sent political opportunity in this last statement; appointed Vernon to the command of six ships and sent him to Porto Bello. On the way out Vernon, who was called "Old Grog" because of the grogram overcoat he wore, even in the tropics (it gave him such a country-squirish appearance) exercised his views on temperance by mixing his sailors' rum ration with water, thereby producing grog, the immemorial tipple of the British Navy. Then he took Porto Bello.

The result was the fall of Walpole's administration and Vernon's elevation to a dizzy pinnacle of prominence from which he tumbled with a crash when he failed to take Cartagena with a far stronger expedition. But the remainder of his history is outside our compass.

Thus far we have discussed only the special cases of eccentricity among naval officers—those who, for one reason or another, have had eccentricity forced upon them. Vernon, Jenkins, and Teach were made eccentric by circumstances. But what about the general case? Is there any clue that will lead us to the springs of conduct which, by shore-going standards, is so peculiar as to make naval men a race apart? I think there is.

The great object of every military officer, in time of war, is to come to grips with the enemy. Only through combat lies the road to promotion, honors, and success. The Army man is always more or less in contact with his opponents. If he is a subaltern there are skirmishes and outpost affairs; if he is in the higher command, the enemy's army is before him, ready to attack or to be attacked. His opportunity is omnipresent.

The naval commander, with the same will to fight the enemy, has always first

to find him—a condition which the introduction of steam and steel has hardly changed. The whole French battle fleet, under Missiessy, puts to sea, and after a cruise lasting months, returns to port without even having sighted a British ship. Nelson and Villeneuve go whirling halfway round the world, unable to make contact. Admiral Rodman crosses 3,000 miles of ocean and never sights a German ship till they surrender. Under the conditions, the realization that he is at last in the presence of the foe is often received with extravagant delight by the naval commander, and he does things that earn him the name of an eccentric.

Let us apply this key to some notable cases. America at the time, and historians ever since have laughed over Captain Hull leaping into the air with a shout of "Now boys, pour it into them!" and splitting his trousers to ribbons as the *Constitution* opened fire on the *Guerrière*. The trousers were undoubtedly too tight; but a good deal must be allowed for the excitement of the moment. Hull himself, and the men of the *Constitution*, had been training for years with that broadside in view; the captain of that very ship there, across the water firing at them, had announced his intention of taking the *Constitution* into Halifax; and they had been under fire for several minutes without returning a shot. It speaks volumes for the discipline on the American frigate that the gun laying was so deadly accurate under the circumstances.

Again, the famous Danish seaman, Tordenskjold, in his *Lovendals Gallej*, meets an English-built frigate bound for Sweden, in 1715. They fight all night in a sea so heavy that gunnery is bad. In the morning Tordenskjold has run out of ammunition and the Swede has lost her main topmast and with it her power of maneuver. The Swede has so much the heavier crew that Tordenskjold dare not board, and his opponent cannot get close enough to try it. In short, all they can do is glare at each other. So the *Lovendals Gallej* hoists a flag of truce, runs down close to her opponent and Tordenskjold shouts his regrets that so interesting a battle should be broken off. But he is out of powder; if the Swedish commander will lend him some, he will gladly continue the fight. The Swedish captain, not unnaturally, answers that he has no powder to spare, and standing on their quarter-decks, the two drink toasts to each other amid the cheers of the admiring crews.

There is something a little singular in the request for the loan of some powder, but again, consider the circumstances. This was Tordenskjold's first single-ship action; he was a Norwegian—that is, he belonged to a subject people—and his chances of advancement in Denmark were poor. He saw his one big opportunity slipping away from him and took the only means he could think of to prevent it.

To the same cause may be referred Commander Perkins' otherwise inexplicable enthusiasm which set him dancing atop the turret of the *Chickasaw*, a target for every gun in the Confederate forts and fleet, as his ship steamed into Mobile Bay.

The corollary of these exhibitions of enthusiasm is the somewhat startling way naval commanders occasionally take to bring about the great opportunity. Take the case of Thomas Boyle of the privateer *Chasseur* on his famous cruise in the Bristol Channel in the War of 1812. He had so thoroughly scared the English merchants that they were no longer sending ships to sea except under strong protection. Boyle was not too long on supplies and feared he might have to run for home. So he captured a fishing craft and sent in to be posted in London the following proclamation:

> . . . I do, therefore, by virtue of the power and authority in me vested (being in possession of sufficient force) declare all the ports, harbors, bays, creeks, mouths, inlets, outlets,

islands, and seacoast of the Kingdom of Great Britain and Ireland in a state of strict and rigorous blockade.

This has been treated as a piece of amusing and delightful whimsy on Boyle's part. It was nothing of the sort; it was simply an effort to drum up business for the fine privateer he commanded by daring the English to come out of their holes.

Lord Fisher's extraordinary proposal to (in his own words) " 'Copenhagen' the German fleet at Kiel a la Nelson", which he confesses to urging on King Edward VII, belongs in the same class, with the added motive that Fisher very clearly saw that England would have to fight Germany some day, and from motives of genuine patriotism wanted to do it in a way that would insure victory from the start. The idea was probably sound enough even if it did make politicians' hair stand on end.

. . . So much for the reputed eccentricity of naval officers in the presence of the enemy. It can be laid directly at the door of a complex of emotions compounded of patriotism, ambition, and fighting spirit—perhaps after all, the same thing under various names. But there is another phase of the question. Commodore Trunnion's eccentricity (in Smollett's book) consisted not in what he did while he was fighting, but in fitting up his home like a ship, sleeping in a hammock, and tacking back and forth down the road against a head wind while riding his horse. In other words, the popular picture of a retired naval officer was (and still is) that of a gentleman who cannot sleep unless a boy is hired to throw buckets of water against his window.

There was more to this in sailing ship days than there is now, though the popular mind, always slow to change, preserves the picture it has enshrined. In the time of Hawke, and even in the time of Nelson, nobody went to sea but sailors. An ocean voyage was a thing to be dreaded, and when a landsman left on one, he bade his family farewell with almost as much ceremony as though he were leaving on the last journey—which he not infrequently was. As for seamen, when they went to sea, they went to stay; Nelson's first visit to the Mediterranean lasted four years, the greater part of which was spent constantly at sea; his second, two years, figures which make the longest cruises of today seem insignificant. And officers entered the Navy as the merest children of nine or ten; the natural product being that they had no homes but their ships and no interests but professional ones.

Now take a man who has been thus tied to a profession for some forty or fifty years and set him down among his fellow citizens who have been in contact with one another and with the rich and varied stream of modern life. He will be a duck among the chickens and all the chickens will cluck at him for being one; in short, he will be a Commodore Trunnion.

But that is not all. If this hypothetical naval commander be a man of force and originality, he will seek to solve the problems of shore life in the light of naval experience. Thus Captain John Montagu (of Hawke's fleet) was anxious to meet a certain lady at court. She proved inaccessible, so Montagu had his captain's barge placed on wheels, and with the barge crew rowing energetically against the empty air, was conveyed to London in state by eight horses. The result was that he became the most talked-of person in town and won the desired introduction to the lady of his heart.

Parenthetically, we might remark that this same Captain Montagu produced another gem, following a spree and a brawl in Lisbon in which he had his eyes blacked. He had the left eyes of the starboard rowers of the barge crew and the right eyes of the port rowers blacked to match his own, "for it would never do for a captain in His Majesty's Navy to be worse off then his men," quoth he.

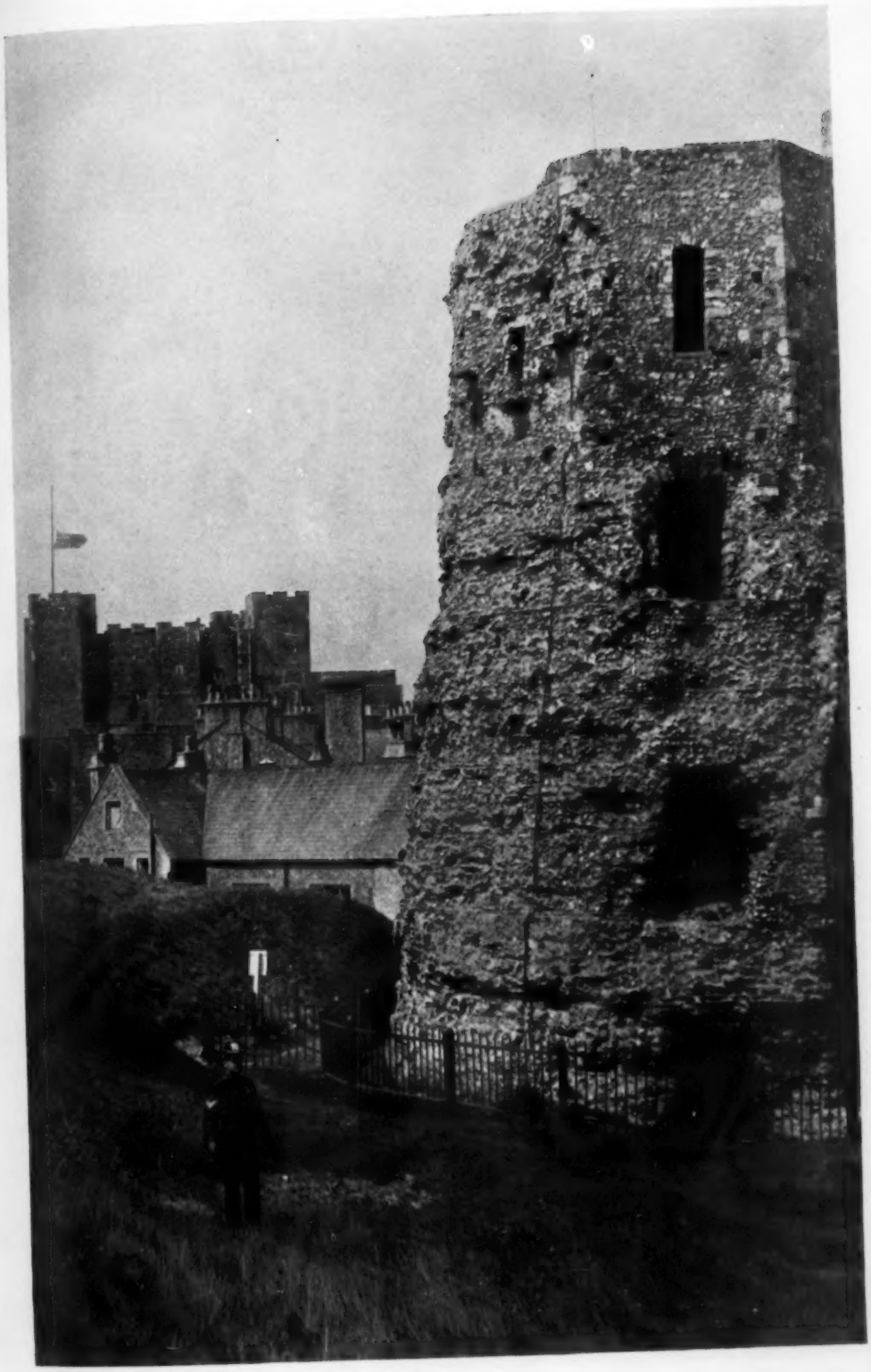
To return—Lord Cochrane attempted to storm the heights of promotion and honors in the same reckless manner that he carried a Spanish 32-gun frigate with the crew of his little 14-gun cutter. He wrote to Lord St. Vincent suggesting that as he was the ablest officer on the station, he ought to have a bigger ship. St. Vincent told him that the capture had been a comparatively easy one; that his (Cochrane's) losses had not been so severe as to indicate a desperate resistance from the Spaniards. Cochrane (a junior lieutenant, mind you, to the first sea lord of the admiralty) replied that the *Victory's* losses at the battle of St. Vincent had been smaller still, but that Lord St. Vincent on that occasion had had no hesitation about accepting very generous rewards.

This was carrying naval methods into administrative life with a vengeance, though the motive already mentioned (desire for opportunity) probably had its weight here too. But the hasty and bad-tempered Cochrane, whose life was a kind of movie serial of hairbreadth escapes and impossible exploits, belongs rather in the company of the adventurers than in that of the eccentrics. An adventurer is one who seeks the unknown; an eccentric, one who seeks the known in an extraordinary way.

Now in this little list of naval men whose unusual actions have amused or horrified their contemporaries there is one thing that strikes the eye. They were all very able men. Eccentrics on land might or might not be able; to name a few of the more prominent there were Samuel Johnson, Beau Brummel, Alfonso X of Castile, and Artemus Ward, only one of them famous aside from his eccentricity. But your naval eccentric (who, I hope I have shown, is simply a naval commander bursting with ideas and enthusiasm) is, nine times out of ten, conscious of extraordinary powers and is either trying to put them to use, or is becoming explosively delighted at the chance of using them.

Run over the list. Blackbeard was the most famous of all the pirates, save only Kidd, and the most successful; Vernon did one great deed if he never did another; Hull was one of the best frigate captains and Boyle one of the best privateer captains of the War of 1812; Tordenskjold was the great sea hero of northern Europe; Montagu was singled out for special mention for his gallantry by Hawke, rose to be an admiral and to conduct an able campaign in the West Indies; ships in the navies of three nations have been named *Cochrane* in memory of that officer's services; and as for Perkins dancing on his turret, the pilot of the *Tennessee* said after the battle, "Damn him! He stuck to us like a leech; we could not get away from him. It was he who shot away our steering gear, jammed the port shutters and wounded Admiral Buchanan." Everybody knows what Lord Fisher's services were.

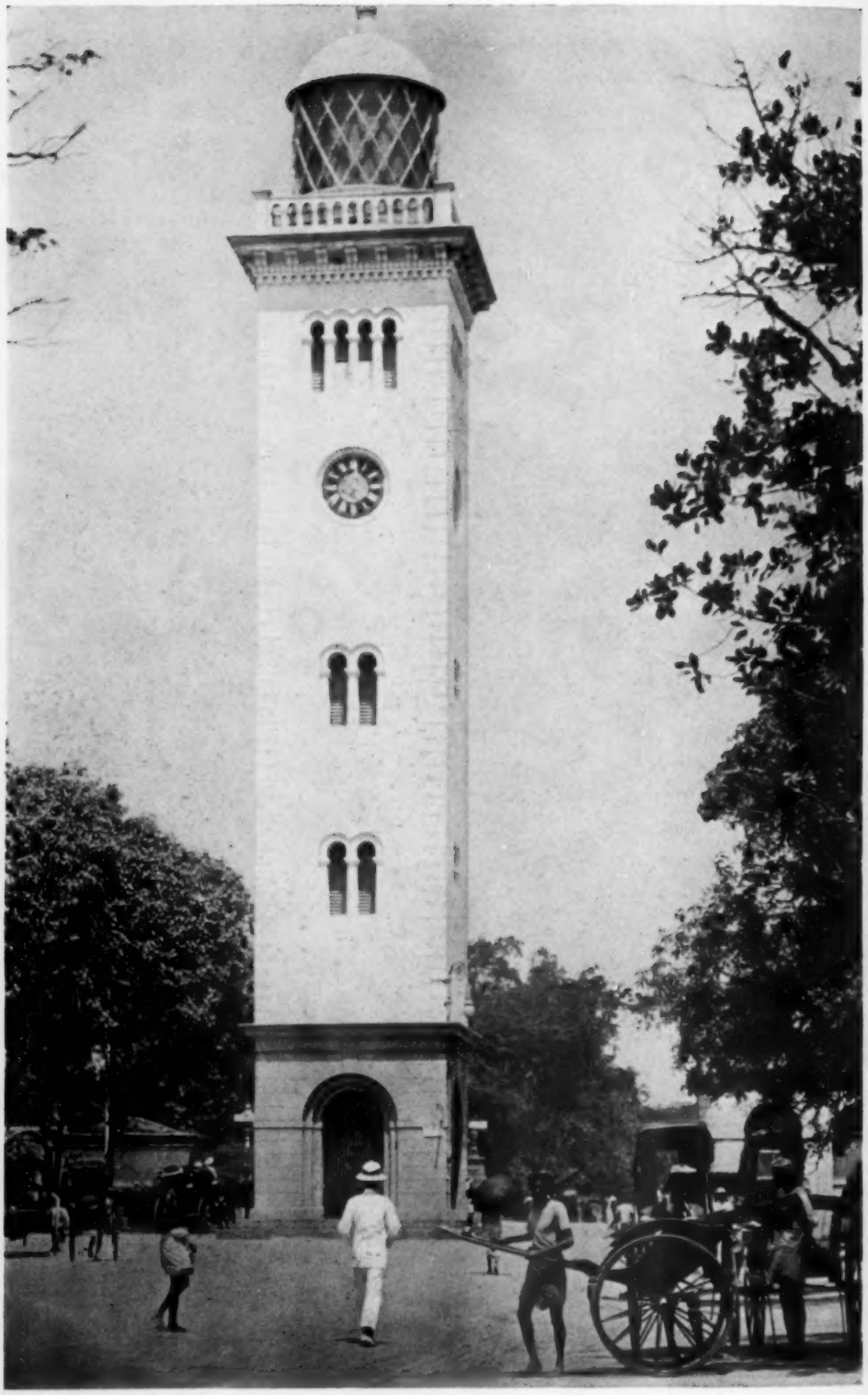
Which leads to the conclusion that eccentric naval commanders are, after all, not so eccentric in the special sense of the word. Perkins dancing on his turret top, Tordenskjold begging the loan of some powder, are of a piece with Nelson sailing into battle at Trafalgar wearing all his medals or Suffren stamping the deck and shouting, "Bring flags! Bring all the flags! Hang them all round the ship!" Eccentric in the sense that any departure from the usual is eccentric, yes; but it is the eccentricity of the battle captain who is never satisfied with his efforts until he receives the enemy's surrender on his own quarter deck.



By Ewing Galloway, New York

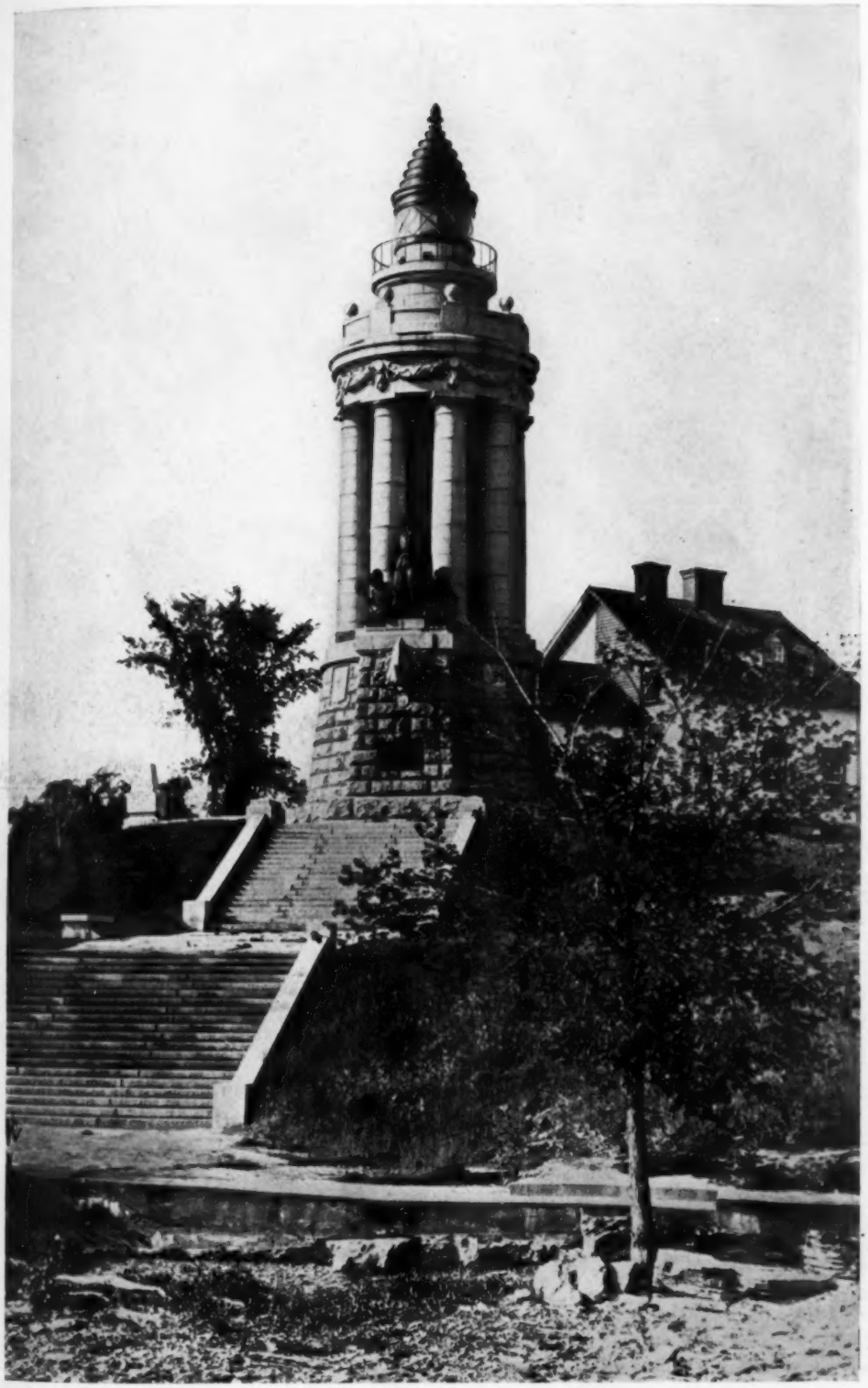
ROMAN *PHAROS* AT DOVER

This is one of the first lighthouses built in Western Europe. The light was made by a large fire on top of the tower. Dover Castle can be seen in the background.



By Ewing Galloway, New York

CLOCK TOWER AND LIGHTHOUSE, COLOMBO, CEYLON



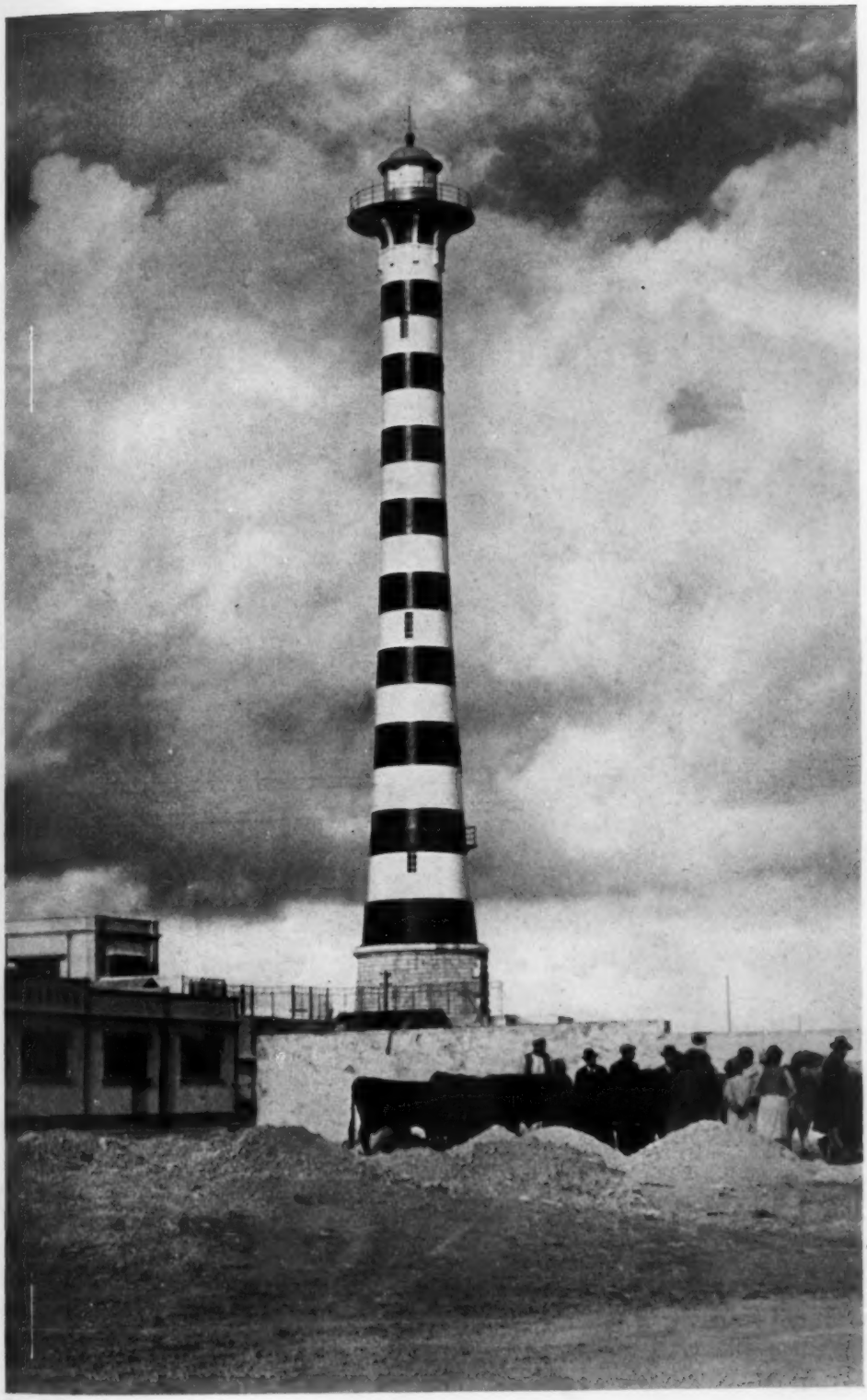
By Ewing Galloway, New York

CHAMPLAIN MEMORIAL LIGHTHOUSE, CROWN POINT, NEW YORK

A lighthouse in the form of a memorial to the discoverer of Lake Champlain. Built in 1909.

By C. P. Cushing. From Ewing Galloway, New York

LIGHTHOUSE ON STATEN ISLAND



From Ewing Galloway, New York

LIGHTHOUSE AT TRIPOLI, SYRIA

By Ewing Galloway, New York

THE LIGHT AT EASTERN POINT, GLOUCESTER, MASSACHUSETTS
From this angle "Mother Ann" can be seen in the rocks.

By Ewing Galloway, New York

THE LIGHT AT EASTERN POINT, GLOUCESTER, MASSACHUSETTS
From this angle "Mother Ann" can be seen in the rocks.

By Ewing Galloway, New York

A LIGHTHOUSE AT DOUELAN, BRITTANY
The buildings in the background show a popular type of the modern American home in its native surroundings.

From Ewing Galloway, New York

A SEVENTEENTH CENTURY LIGHTHOUSE AT GENOA, ITALY

THIS AND THAT

By REAR ADMIRAL GEORGE R. CLARK, *U. S. Navy (Retired)*

A Little Tragedy

A DROOPING, uniformed figure, slumped down in a lobby chair at the Occidental Hotel in San Francisco years ago, attracted the attention of a naval officer who, recognizing with a start his commanding officer, with interest and sympathy aroused, seated himself alongside his despondent senior. He had not long to wait before being told a strange tale of woe that made his own troubles seem trivial and commonplace. "Young man," said the figure now aroused from its reverie, "in me you see the victim of an unfortunate combination of circumstances that would have crushed a weaker man. Listen, and believe it or not. Early yesterday morning my new executive officer excitedly rushed into the cabin and stammered out a statement that I was due at Mare Island that very day to report for temporary duty. I just had time, he said, to catch the navy yard tug. He had suddenly come across mysteriously delayed orders which he nervously sealed in an envelope and placed in my hands. 'Please hurry, Captain, and I'll get the launch ready to take you to the tug.' Moved by the urgency of the situation, I accepted everything as told me, and without looking into the matter further or even glancing at the orders, hurriedly made preparations and caught the tug where, happy at the outcome, but exhausted by my efforts, I sank into a comatose state that lasted until my arrival at the yard several hours later. There, ushered into the presence of the commandant, I expressed hope that I was on time and tremblingly handed over the still sealed orders. Then—well, let us draw the veil a moment while I pull myself together. The commandant broke the seal, read the orders, then in the soothing and reassuring tone used by physicians when talking to the mentally sick, told me that everything was all right—nothing to worry about, that although the *month* and *day* were correct yet *the orders were exactly one year old*. 'You have forgotten, Captain,' he said, 'that these orders were canceled by telegraph soon after issue and evidently were only recently suddenly rediscovered by your new executive officer who failed to note their hoary age.' Then, noting signs of apoplexy, signs that I could sense myself, he begged me to be calm while he sent for the doctor."

"Well," said the disconsolate in conclusion, "there is nothing more to say. In fact, I couldn't say anything more if I tried; only this—I don't know whether to commit murder or suicide. The ship is no longer big enough for both of us. The executive officer or I must go. Murder or . . . " The tired voice faded out as its owner sank into a fitful sleep, troubled, no doubt, by dreams of reshaping the sorry scheme of things nearer to his heart's desire.

"Alas," reflected the junior as he slipped quietly away, "life is full of little tragedies."

A Pyrrhic Victory

The four middies on the *Tuscarora*, fresh from Annapolis, had not been on board long before they began to grumble about the hardships in general and the loss of sleep in particular involved in a "watch in four" on the forecastle. Why, it was awful. It was just too much. What was the use of having officers, *good* ones, too, wasting their time on the forecastle, a part of the

ship that could jolly well look out for itself anyway? Why weren't they given a regular watch aft on the quarter-deck where their outstanding abilities could be utilized? Why—well, something ought to be done about it. The conditions were wellnigh intolerable and growing worse. Goodness knows the Naval Academy, bad as it was, was better than this seagoing stuff.

"What do you think about it, Boatswain?"

"Well, I think you ought to take your medicine and stop growling. That's what Farragut and Porter would have done and they weren't half bad guys. If you ask me, I think the old man wants to keep you as far away as possible. Your are lucky in not having to stand watch on the jib boom."

Turning scornfully from this Job's comforter the squad went into conference and in a short time had worked themselves into a state of mind that demanded relief. It was just now a question of how to go about it. A bright youth suggested asking for a "dummy" to stand the midwatches. In other words, to drop that unpopular watch from the schedule. That was sometimes done in well organized ships, why not in this one where the need was so great? The idea grew in favor and soon the conspirators were drawing lots from a cap to see who should have the honor and doubtful pleasure of presenting the petition for redress of grievances. The winner in the lottery, after magnanimously but vainly offering the privilege to the others, departed for the cabin while his anxious shipmates gathered at the break of the forecastle to await his return. Minutes passed and then more minutes before the young hero was "admitted to the presence." But it was not long before he emerged. The anxious group from its point of vantage scanned the returning messenger in vain for the springy step, the bright eye, the joyous mien usually attributed to the bearer of glad tidings. Mercury (by which name he was known thereafter) sank into a seat and told his story. "I spoke my little piece," said he, "and thought I had made an impression. I was right. 'Why, yes, I'll put on a dummy,' said the skipper. 'That's all right. I might as well have *five* dummies on as *four*.' And then he turned to his papers."

"Ha, ha," roared the boatswain. "You budding Nelsons ought to apply for sick leave and have your heads examined. Ha, ha."

After the ribald laughter had subsided the crestfallen four found voice. "Another such victory and we are undone!" exclaimed one. "Yes," assented another, "It's only a Pyrrhic victory, but that's something."

King for an Hour

Many years ago two young officers sat on the forecastle of the *Wachusett* moored in the harbor of an island city. Sweet strains of the plaintive music typical of the islands, borne on gentle, flower-scented breezes called to them from the shore to leave the half-deserted ship and enter into the joys of the dance at the palace, given in honor of the king's coronation. Red wine, bright eyes, sweet song, the age-old trio, were there, as alluring, as appealing as in the days of Ulysses. Stronger grew the entreaty, weaker became the resistance as the sorely tried and tempted youngsters, all too prone at best to heed the call to arms, stirred restlessly and glanced longingly toward the beckoning palms of the most care-free land in the world. Hadn't some wise man in the long ago counseled youth to "seize the goods the Gods provide thee"? Didn't everyone know that old time is still aflying and that the flowers that bloom today, tomorrow may be dying?

"Look here, Carlos," said the elder, "what is the use of temptation if you don't submit to it? The skipper couldn't have foreseen this particular occasion when he cautioned us against going ashore so much. Why, he is ashore right now with the rest of the crowd enjoying himself. Just one more little trip ashore won't hurt anybody.

Let's be like Rip van Winkle with his drink and not count this one. What say?" "You have convinced my wavering soul," responded Carlos, and then and there the last defenses crumbled and the struggle ended as have all such contests since the beginning of time.

The decision once made, the adventurers, now quite sure that they were right, lost no time in getting ready. Raids were made upon the wardrobes of the absent shipmates with some surprising and startling results. Shore clothes of ancient vintage including hats too large or too small, trousers that needed reefs, ties that cried to heaven, and other accessories joined in producing two suits that would have arrested attention in the most blasé community in the world. But never mind. Trifles are the concern of little intellects. The world was young and the joy of life was just around the corner.

The palace, a structure of most generous proportions, was made in the shape of a square, each side of which was furnished with a wide porch, the four corners supplying plenty of room for serving tables. Now, on each table rested a large well-filled punch bowl, the contents of which differed from the others in flavor and potency, thus providing for the various tastes of the discriminating guests. However, it was deemed etiquette to treat the four stands with strict impartiality, dancing lightly with one of the many hostesses from one to the other. This plan met with instant and unqualified approval from the new arrivals who entered at once into the spirit of the occasion with zest and abandon. After the first circuit had been made it was agreed by the worthy pair that a certain degree of restraint in their joyful activities would be necessary if they wished to maintain the decorum expected at such functions. To their credit, it may be said that this resolve, difficult as it was, was kept with a certain degree of success that surprised and pleased both themselves and their friends. In furtherance of the good resolve one of the worthies, during a lull in the festivity, detached himself from the revelers and explored alone the many nooks and crannies of the huge mansion generously opened that day to the public. The throne room especially excited his interest, an interest that grew with the sight that met his gaze on entering the half-lighted, wholly deserted chamber. Soon his attention centered upon the great "chair of state" resting upon a dais and overhung with a huge velvet canopy. Carpeted steps led invitingly to this seat of the mighty, a challenge he accepted with alacrity, and at once sank luxuriously into the comfortable depths of a real throne. From a forecastle to a throne! What an experience, and all in one afternoon. Thus he pondered until a strange drowsiness, a delicious languor, a sense of physical well-being, both delighted and alarmed him. The faint drone of distant voices, the growing darkness of the room, soothing, caressing, quieting, added to his helplessness. Outside, through the transom, his gaze rested upon the leaves of a palm seemingly waving a friendly greeting. The song of a bird, soft and moving, reached him in a lullaby. "Sleep, sailor, sleep. Dream of battleships no more." What a good world! What a good afternoon! What a—the head fell to one side, the frame relaxed, the borrowed hat fell to the floor. The usurper slept.

The afternoon waned; signs of low tide appeared in the punch bowls; the crowds thinned. At last nothing was left but to go home. The *Wachusett* leader mustered his gang and reported one missing. The search party was just about to give up when Carlos, keen to find his buddy, detected rhythmic sounds reminiscent of notes often heard issuing from the berth deck in quiet night watches at sea. The sound in this case came from no less a place than the throne. Incredulous but anxious the searchers entered the sacred chamber where their gaze fell upon a sight, dimly discerni-

ble in the lengthening shadows, that held them where they stood. Settled snugly in the gilded chair was their lost friend, one arm limp at his side, a leg extended in careless abandon. No crown adorned his head, but at his feet, imparting a democratic touch to the scene, rested a hat that had seen better days. Crowning the picture was a beatific smile resting upon the sleeper's face, a smile that spoke of peace, blissful and complete. Gaze your fill, henchmen and followers, you will never see the like again.

And then followed what might well be called an involuntary abdication. The rescuers gently but firmly disentangled the sleeping sovereign from his throne, and, accompanied by a self-appointed hat bearer, proceeded to the street where a passing vehicle of sorts was impressed into service. The coach of the usurper, accompanied by halberdiers without halberds, footmen without uniforms, outriders without horses, torchbearers without torches, all followed at a respectful distance by Carlos bearing aloft the badge of his office, got under way. Seeking the quiet streets, the procession wended its way to a modest hostelry where, much to the chagrin of the visitors, a doubting innkeeper, quite unimpressed by the spectacle, insisted on knowing something about the identity of the inmate of the coach and his standing in the financial world. With much difficulty and many appeals to the more affluent of the footmen enough coin of the realm was collected to satisfy these embarrassing but reasonable demands, and the hero of the happiest and most peaceful reign known to man became the guest of a lowly commoner.

The escort, their duties completed, disbanded and went their several ways. The driver of the coach, owing to the deficit in the royal treasury, had to be content with a few coins and many promises, and proceeded sadly on his way in quest of better and bigger fares. The pleasing music of a stringed instrument came from a native hut as the moon flooded the land with silvery light and the charm of a tropical night settled down upon the city.

Just an Idle Day
(In the long ago)

The favorable impression made by Pernambuco upon the people of the *Alliance* was due partly to the beauty of the place and partly to the feeling of relief that came after landing our last smallpox patient at Bahia, a feeling that would have made any change welcome, even Colon in summer or the Maine coast in winter. Bahia and smallpox; Pernambuco and health. The doctor, released from his trying duties, and I, recovered from an attack of coast fever, were prepared to like anything, to see "sermons in stones and good in everything."

But without this aid Pernambuco would have excited interest and commanded admiration. Rumors of dark-eyed beauties, a wonderful natural breakwater, and a seductive and potent rum had attracted all the various types that go to make up our mess, from the impressionable young midshipman, with a heart for any fate, to the well-seasoned paymaster with "a great thirst upon him." None were disappointed unless it may have been the paymaster who thought the rum just a bit lacking in the pep to which he had been accustomed. Even the veterans who had served on all stations were impressed by the sight of the coral reef serving as a breakwater to protect the many ships lying six abreast in as snug a little harbor as ever gladdened the heart of a storm-tossed mariner. However, the city itself, white and inviting, with the strange attractiveness of a foreign city seen for the first time, beckoned to the youngsters, while old Olinda, just visible on the easternmost point of the continent, offered pleasant fields to lovers of the mysterious.

Soon a small party, including, of course the middy, landed on the mole, and reject-

ing all offers of the native Jehus, proceeded to explore the place on foot. They passed through dirty but well-paved streets lined by tall houses with fronts decorated by tiles in curious designs not unlike the backs of old-fashioned playing cards. Street cars passed at irregular intervals, drawn by mules urged to full speed by loud cries and frequent lashings from their drivers, who, seemingly intent only on reaching the end of the line, looked neither to the right nor the left for passengers. Two things in Brazil do move swiftly—revolutions and street cars.

Meanwhile the middy, with eyes raised to the balconies in search of the far-famed beauties, might have been run over had it not been for the care of his less eager seniors. But his quest was at last rewarded by the sight of a bright face gazing with deep interest at the group of foreigners below. Then, whether by accident or design, a flower with a ribbon attached fluttered down and fell at the feet of the youngster. He picked it up and, raising it to his lips, glanced quickly at the window but the beauty had fled. If anything had been wanting to complete his disorder of mind this would have done it and it was with difficulty that we got him to move on. But the conventions must be observed here as elsewhere and the procession finally got under way.

The course now led over the bridges, the best places from which to study street life. Here lottery ticket sellers tempt one to try his fortune, while blind beggars, with hands extended, plaintively plead for charity. Fruit vendors sleep lazily in the sun, often waking to find that their wares have all been stolen. Splendid carriages roll by carrying the wealthy classes to their suburban homes in Boa Vista. Over all, prince and pauper, native and foreigner, beats down the tropical sun.

So it was with pleasure that the party at last caught sight of the American flag flying over our consulate. There they rested while the consul, glad to see people from home, talked entertainingly of the city and the country. The statistician of the group learned that several lines of railway extend hundreds of miles into the interior, passing through marble, sugar, and gold districts reaching a region where—but why go on?

All had learned that when the middy shows signs of impatience something must be done. In this case the group, pleading the lateness of the hour, took their leave. Hailing a carriage, the driver of which spoke a bit of English, they were soon on their way to Olinda with Jehu as guide, philosopher, and friend pointing out the many points of interest. Olinda on the easternmost point of America, the historian took pains to inform the others, is as far east of Washington as San Francisco is west of that city. Out at sea could be made out the white sails of ships, some standing to the southward and others homeward bound to that glorious land of ours far away in the north.

But none of these things interested the knight of the sorrowful countenance whose depression of spirits found a fitting accompaniment only in the old monastery ruins, the moaning of the sea, and the shades of evening now fast coming on. On the way back the flower and the ribbon were tenderly placed between the leaves of a little book of poems there to remain until the memory of the giver be driven away by the next pretty face, or until the mail arrives from home. As the visitors approached the landing they were reminded that the Pernambucans still cling to the quaint customs of ancient times, for from a neighboring tower "the curfew tolled the knell of parting day."

The inspection officer on his rounds the next day picked up a trampled, discarded flower with a small ribbon attached. The mail had come in from home.

When the Lid Blew Off

Shortly after the outbreak of the war and before the entry of the United States into that conflict, the German cruiser *Geier*, accompanied by the collier *Locksun* closely pursued by Japanese warships, sought safety in the harbor of Honolulu, Hawaii, where, safe in a neutral port, she remained interned until April 6, 1917, when her status as a friend suddenly changed to that of an enemy. Every privilege permitted by our generous regulations to the personnel of interned ships was extended in this case, and the officers and men, although chafing, no doubt, under their enforced idleness, enjoyed life in this paradise of the Pacific, a community noted for its readiness to extend warm friendship and full confidence to all strangers and sojourners within their gates.

It is true, the engines of the vessels were disabled, the battery was rendered harmless, and the wireless plant put out of commission, but otherwise conditions on board were unchanged, and the paroled personnel rested under no obligation but that devolving upon all to be true to their oaths to refrain from any unneutral act. But it transpired that our visitors were governed by standards differing widely in these matters from those of their hosts. Light began to fall upon the real conditions on the day when diplomatic relations with the Central Powers were broken.

On February 4, 1917, early risers near the water front in Honolulu were startled by the sight of smoke issuing from the gun and air ports of the *Geier*, accompanied by most unusual sounds. Already made suspicious by other occurrences, these observers needed only this new evidence of irregular proceedings to convince them that serious trouble was brewing, a conviction they immediately communicated to the naval officer in command of the district. Then things happened according to carefully prearranged plans. A United States naval officer representing the commandant, in his best uniform and his politest manner, appeared on board, presented the commandant's compliments and begged to be informed of the surprising proceedings. "You are very kind," said the German captain, also in his best uniform and manner. "Give my compliments to your senior and say that everything is all right; we are only engaged in the usual Sunday work." The American, unbelieving and indignant, suddenly shifting his manner, and closely followed by his squad of bluejackets, rushed below where he found fires burning under empty boilers and various preparations made to destroy the cruiser, a grave danger to the shipping in the harbor, including an Army transport, and to the men, women, and children in the vicinity. The flames were extinguished and then all hands were assembled on deck, divided into companies, and marched off to various Army posts, their new places of internment.

The second phase of the incident began with the transfer of the crew and officers to stations on shore and of the ships to the naval station at Pearl Harbor, Then, too, began an unsatisfactory and perplexing period when the visitors, in spite of all that had passed, had still to be regarded and treated as friends. The next two months demanded constant vigilance on the part of the American naval officials, who, under orders imposing the observance of strict neutrality, had yet to forestall attempts to sink or destroy the warships by the small German crew which internment rules required to be kept on board.

To guard against mishap our officers, still acting under internment rules, insisted on keeping a small American force on board to "assist" as ship keepers and to show respect for the German flag. The foreign commander, seeing that the precautions were too much for him, at last withdrew all his men, hauled down his flag, and shortly before the memorable April 6, abandoned his ship to his over-

zealous hosts. Thus ended all danger of disaster such as later occurred on a large scale at Scapa Flow.

The declaration of war by the United States cleared the atmosphere of all subterfuge and pretense, and made the way clear for the repair of the ships, a work that, begun at once, was pushed to completion four months later. It was a memorable day when the former H.I.M.S. *Geier*, now the U.S.S. *Schurz*, with German guns and ammunition on board, was placed in commission under the American flag.

On the eve of sailing for the mainland a small dog, a dog with a past, was enlisted for the cruise. "Moritz" was a gift from the Emperor of Germany to the captain of the famous German raider *Emden*, and after the loss of that vessel, had by some strange chance been brought to Honolulu. After a more or less eventful career on shore, he was claimed by the call of the sea, and sailed again under a strange flag. He gained a good name for obedience and sobriety which he maintained until the night before the *Schurz* sailed on her fatal cruise. On that night he "jumped ship" and remains in desertion to this day. However, if he gives himself up he will receive a full pardon for the sake of his former master, the gallant officer and gentleman who commanded the *Emden*.

In marked contrast with the conduct and standards of that outstanding figure of the German Navy were those of the commanding officer of the *Geier* as revealed by his captured diary. The publication of this diary in the Honolulu papers, revealing as it did the sympathy of many local residents with the enemy cause, aroused a storm of indignation and protest, and seemed to force a declaration of the flag under which every one served. It is significant that this incident in making for a better understanding and improved conditions was coincident with the passing of the interned ships.

Discipline Would Help

In this period of restlessness, instability, and uncertainty the selection of a calling for their sons is not the least of the problems confronting troubled and anxious parents. It may be said that with the many lines to choose from this should be a comparatively easy task, but, after all, the fields of endeavor that give assurance, or even promise, of opportunities of great usefulness and reasonable reward are not great in number or easy of entrance. While, of course, all kinds of work are useful and necessary yet it is a proper and laudable ambition on the part of parents to see their sons started on the road that leads through the fields of richest harvests of comfort, happiness, and usefulness. The vast strides made in recent years by the naval service as a factor in the national life, the improvement in the Navy's personnel, the fast deepening hold of the Navy upon the trust and affection of the American people, make the consideration of a naval career wise and profitable. The truth is gradually becoming known that the old swashbuckler type, common in the ships of the infant Navy, has been replaced by the clean, self-respecting, self-reliant, ambitious, young American of modern times (with the Naval Academy doors open to him) as truly as has the old sailing frigate been driven from the seas by the powerful dreadnought of today. The more exacting demands of the complicated mass of machinery in the twentieth century man-o'-war are being met by a class of men worthy in every respect of the country's confidence, a company with which parents may well be proud to have their sons associated.

As an instance of the fast passing prejudice against the wearers of the blue may be mentioned the case of a father who not long ago visited one of our training stations in search of his son who had run away from home and enlisted under a false name. This father, a well-educated,

well-to-do citizen of a western town, quietly observed the doings at the station for three days before making himself known, and then confined his story to the commandant, the old story of prejudice against the naval service. "But now," he said, "my prejudice has been overcome; I am so impressed by all that I have seen that I not only want my boy to stay in the service but to bear his true name even if that involves punishment for false enlistment." "Captain," said the president of a great railway to the same commandant, "I should be glad if I could send all of my employees to your station for a four months' training to learn, among many other things, the lesson of discipline."

Thus it is that when the real conditions of naval life become fully known parents will be well content to give their sons to a work honorable and useful to themselves and to their country. The ringing of the bells in the churches and schools, the movement of the cars in the streets, the coming and going of vessels, the tilling of the soil, the general maintenance of "business as usual"—all these are made possible by the man in blue on watch on the first line of defense.

It is sometimes said that if the money now spent for warcraft were used for roads, churches, schools, and the like, the peace, comfort, and happiness of our people would be vastly promoted. But of what avail would be the roads, churches, and schools if, unprotected as they would be, they were left a prey to the first unresisted invader? Is the merchant wise who displays his wares in an unguarded street? One has but to remember the experience of Boston on the occasion of the famous strike of the police force.

In the old sailing ship each member of the crew had a duty, an important task, an individual, personal part in handling the ship in all the maneuvers necessary to keep her on her course and bring her to her port. Every one from cook to captain was a shareholder in the company, understood his work, was keenly interested in the success of the enterprise. A fine understanding existed between forecastle and quarterdeck. The team work was excellent. This satisfactory condition could not have been brought about without the preparatory course at the training stations where the undisciplined apprentices were given an overhauling to iron out differences and reveal a general idea of the problems ahead. Cannot this Republic of ours be likened to a sailing ship? Should not the crew of the great ship, the American Republic, vitally interested as they are in the voyage, be given the advantage of universal training of instruction in discipline, orderliness, punctuality, alertness, the better to qualify them for their parts in keeping the ship off the rocks? It would seem that the plan is at least worth a trial.

"Without discipline," said Napoleon, "neither political independence nor civil liberty can endure."

☆ ☆ ☆

There is nothing which binds one country or state to another but interest.—GEORGE WASHINGTON.

PICKING THE STARS

By CAPTAIN J. F. HELLWEG, *U. S. Navy*

ALMOST THIRTY-ONE YEARS ago, a midshipman on his way to China met an old officer on the trans-Pacific steamer who gave him some very excellent advice: "Youngster, when you reach the Asiatic station get on the strictest and the tautest ship you can, for as the twig is bent so the tree will grow. And then take up something as a specialty. If you haven't any originality, learn the equipment allowance list by heart, but learn something better than the other youngsters, know more about it than they do."

Thirty-one years ago, stars were not as well known as they are today. Many of the old navigators knew little or nothing about stars and depended entirely on the sun for their positions.

When that young midshipman reported on board ship on the China station and went to the chaplain for books on stars to study, he learned that the only book the chaplain had in the library was *A Summer Evening Sky through an Opera Glass*, a book prepared for a young ladies' seminary. And the navigator had only the old standby: *Lecky's Wrinkles in Practical Navigation* which contained a few sketches of some of the major constellations.

Now, thirty-one years later, there are so many star charts, star finders, diagrams, and gadjets for finding stars, that this article may appear to be superfluous; but, from time to time, requests have been received from officers asking that the method of "picking the stars" conceived almost thirty years ago, be published for general information.

It is very probable that some officers are familiar with this method. Certainly those officers who, as midshipmen, made their practice cruises on the old *Hartford* in the summers of 1903 and 1904, and those officers who served on the old *Pennsylvania* in 1905 and 1906 will remember it.

In explanation of the method, it will be necessary to state some astronomical axioms that you all know and then apply them in the solution of the problem.

You all know about the mean sun and why it had to be conceived, so I'll not have to touch on that subject except to note that the movements of this mean sun are uniform, and the functions of this mean sun are tabulated along with all other astronomical functions in the *Nautical Almanac* and the *Ephemeris*.

The following functions are taken from the 1931 *Ephemeris:*

R.A.M.S.	23 March	23–58–04.6
R.A.M.S.	24 March	00–02–01.2

Therefore the mean sun passed the vernal equinox at about 12:00 on March 23, 1931. The exact time of passage was 11:42.

R.A.M.S.	22 September	11–59–34.4
R.A.M.S.	23 September	12–03–31.0

Therefore the mean sun passes the autumnal equinox at about 00:00 on September, 22. The exact time is 02:36.

The following functions are taken from the 1932 *Ephemeris:*

R.A.M.S.	22 March	23–57–07.68
R.A.M.S.	23 March	00–01–04.24

Therefore the right ascension of the mean sun will be zero at about 17:00 on March 22, 1932. The exact time will be 17:29.

From this it is apparent that the R.A. M.S. was zero at about 12:00 on March 23, 1931, and that it advances at the rate

of two hours per month, again becoming zero at the next vernal equinox at about 17:00 on March 22, 1932.

As this scheme for "picking the stars" is done mentally, entirely without the aid of star charts, diagrams, pencil, or paper, whole numbers are used as they are sufficiently accurate approximations to insure accurate results within the possibilities of angle estimating.

It is seen that the R.A.M.S. advances at

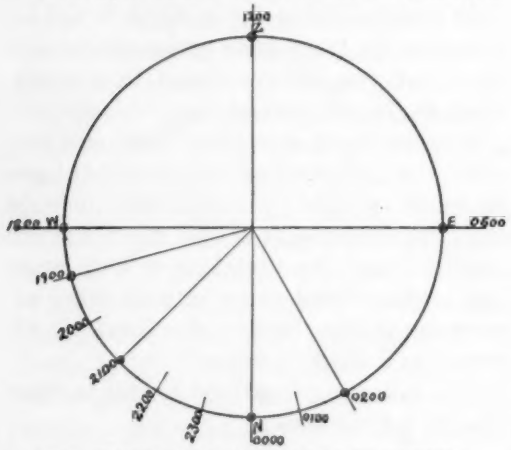


FIG. 1. MEAN SUN'S POSITIONS FOR VARIOUS HOURS OF THE DAY

the rate of 2 hours per month, or 120 minutes per month. Assuming a 30-day month, this gives a rate of 4 minutes per day.

Check it and see how closely it agrees with the tables. For instance, at the end of six months the R.A.M.S. at this daily rate equals 12 hours, which jibes with the tables exactly.

In determining the R.A.M.S. for any date, it is therefore only necessary to count the number of whole months from March 23, allowing 2 hours for each, and then count the remaining days to your date and multiply by 4 minutes. Adding these two results gives you the exact R.A.M.S. for your date. Try it and see how simply it works.

As the mean sun is uniform in its movements, it is always in your meridian at noon time, in the western horizon at 6:00 P.M., under foot at the nadir at midnight, and in the eastern horizon at 6:00 A.M.

In other words, the mean sun moves uniformly through each quadrant in 6 hours or at the rate of 15° of arc each hour.

Keeping this in mind, it is very easy to determine the exact position of the mean sun at any hour of the night. For example: At 7:00 P.M. the mean sun is one hour below the western horizon. At 9:00 P.M. the mean sun is three hours below the western horizon, or halfway to the nadir. At 2:00 A.M. the mean sun has advanced past the nadir by two hours and is 30° from it, at the same time being 60° below the eastern horizon.

Visualize a celestial circle passing through your zenith and nadir and through the east and west points of your horizon, in other words, your prime vertical. At different hours indicated, the positions of the mean sun are as shown in Fig. 1.

You now have a method of determining mentally exactly where the mean sun is at any hour of the day or night. You also have a method of determining exactly what the R.A.M.S. is for any day of the year. By applying the R.A.M.S. which you have determined mentally—no paper or pencil permitted—to the position of the mean sun at the instant you make your calculations, you can determine exactly the position of the first point of Aries, which is the position of zero hour's right ascension, the point from which all right ascensions are calculated from 0 to 24 hours.

Imagine yourself facing north, standing at the center of a celestial circle passing through the east and west points of your horizon, and through your zenith, your prime vertical. See Fig. 2.

It is 9:00 P.M. on May 24, 1931. Visualizing yourself as indicated, you at once know that the mean sun is halfway down the quadrant below the western horizon. As it is May 24 you know that the vernal equinox has advanced since March 23, two months and approximately a half day. Therefore, the R.A.M.S. is 4 hours plus.

Still facing north, hold your left arm downward at an angle of 45° below the horizontal and you are pointing at the position of the mean sun. Then count around through the nadir the four hours right ascension of the mean sun and you find that the first point of Aries is one hour past the nadir. Having determined mentally the position of the first point of Aries, you are now in a position to determine the right ascension of any star in the heavens. For example: A star is halfway up in the western sky—Fig. 2. The angular distance from the first point of Aries to the western horizon is 1 hour to the nadir plus 6 hours to the horizon or a total of 7 hours. A star, No. 1, halfway up in the western sky is 3 hours above the horizon, therefore its right ascension is $7+3=10$ hours. In the same way, the right ascension of a star, No. 2, in your meridian is 7 hours to horizon plus 6 hours to the meridian or 13 hours. In other words, at that instant, the right ascension of your meridian is 13 hours which is the local sidereal time.

And to continue, a star, No. 3, which is one-half up in the eastern sky, will have a right ascension of $13+3=16$ hours.

Practice this method and you will be astonished at the closeness with which you can estimate the right ascension of any star in the heavens. Practice it first with stars you know until you feel some confidence in your ability to estimate angles of 15°, 30°, 45°, 60°, and 75°. Use both arms in making these estimates and note the positions of your arms for each angle. After having perfected yourself with stars you know, try it on stars you do not know and after awhile you will be very agreeably surprised at the facility with which you can determine the right ascensions of them all.

You are now in a position to estimate the right ascension of any star with accuracy and can proceed with the next step.

The next step is quite simple and much shorter to explain. We all know that the angle of elevation of the elevated pole above the horizon equals the latitude of the observer. Note the direction of north by your standard compass unless you can see the pole star. Face to the eastward and hold your left arm pointing to north and at an angle above the horizontal equal to your latitude. You are pointing to the earth's elevated pole. Then hold the right arm up over your head keeping it at right angles to the left arm. Sweep it back and forth from east to west. Your right arm,

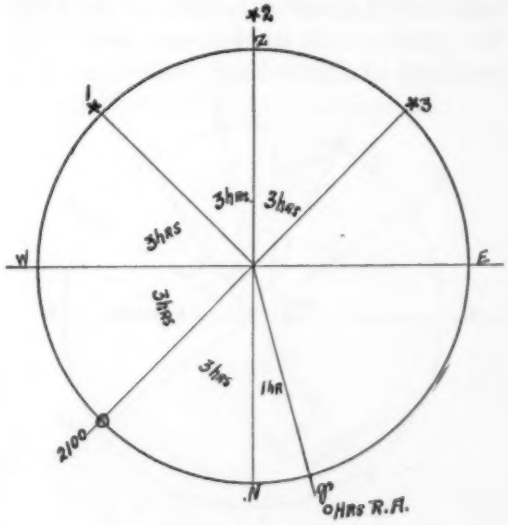


FIG. 2

9:00 P.M. R.A.M.S. 4 hrs.
24 May, 1931. L.S.T. 13 hrs.
Star No. 1. R.A. 10 hours
Star No. 2. R.A. 13 hours
Star No. 3. R.A. 16 hours

if it could be extended, would scribe a circle on the sky which is the celestial equator, from which the declination of all celestial bodies is measured.

You have now determined the bench mark or reference plane for measuring declination. Keeping the right arm pointed toward the celestial equator, move the left arm till it points to the star whose identity is in question.

The angle between your two arms represents the declination of the star. If its declination is south, you will have to shift your arms for comfort in estimating the

angle, pointing the left arm to the celestial equator and using the right arm to point to the star.

This is the method for determining the declination of stars *before* they reach the meridian.

After the stars have passed the meridian, your positions must be reversed. After determining the direction of north, face to the westward, and hold the right arm above the horizon at an angle equal to the latitude and describe the circle of the celestial equator with the left arm held overhead and at right angles to the right arm.

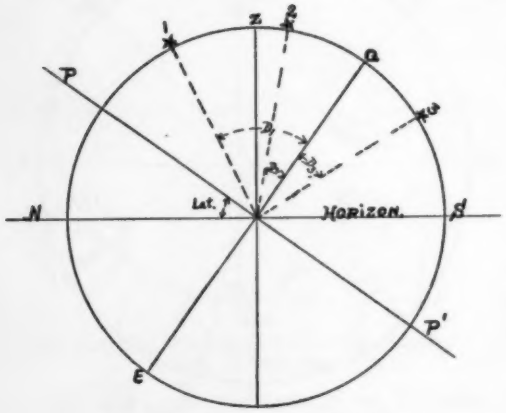


FIG 3. PLANE OF THE MERIDIAN
Declination determination

PP' Polar axis
NS North and south points of horizon
EQ Plane of celestial equator, from which all declinations are measured north or south
★1 Star in northern heavens whose declination is greater than the latitude of the observer
★2 Star in northern heavens whose declination is less than latitude of the observer
★3 Star with south declination

Fig. 3 shows the declination determination of three stars, two north of the celestial equator and one south.

After practicing this method on stars that you know, and of whose coördinates you are certain, try it on unknown stars and you will quickly develop your angle sense in estimating the angular distance between the celestial equator and the stars.

Having mastered these two methods: (1) to determine the right ascension of any star; (2) to determine its declination, you are now ready to pick any star in the heavens.

You may have asked yourself the question: What use is this when I can see the other stars and can always get one that I know? Perfectly true, but sometimes you cannot see other stars due to clouds, or the stars you know may not be in good positions for navigational sights.

In either case, you can take an observation of the star whose position is best suited for your purpose, or it may be the only star you can see at that time; and after having obtained its altitude, you can then quickly determine mentally its identity. The sight may save you and the ship considerable embarrassment if not disaster.

I have frequently found it of great assistance to take a couple of stars, one on either beam. Their resultant lines of position show you where your course is leading you. One taken ahead or astern will show you how far along your course you have traveled. In approaching a coast at night, particularly if the coast is not well lighted, the importance of such sights cannot be overestimated. If you have the time and inclination, you should also take one star on the prime vertical and one for latitude. With these five sights taken with a good horizon, your position is accurately fixed and you can stand in on even a poorly lighted coast with confidence.

Having determined mentally the right ascension and the declination of the star, and having observed its altitude—for working the sight—and having noted its approximate azimuth, you can quickly select the proper star in the *Nautical Almanac*. You will find after a little practice that your estimated right ascension and declination will approximate very closely the recorded right ascension and declination in the *Nautical Almanac*. The magnitude of the star will also aid you in identifying the star in the tables as it is very seldom that you will find two stars with ap-

proximately the same coördinates and of equal magnitude, particularly among those stars known as navigation stars. And you are not interested in the fainter stars.

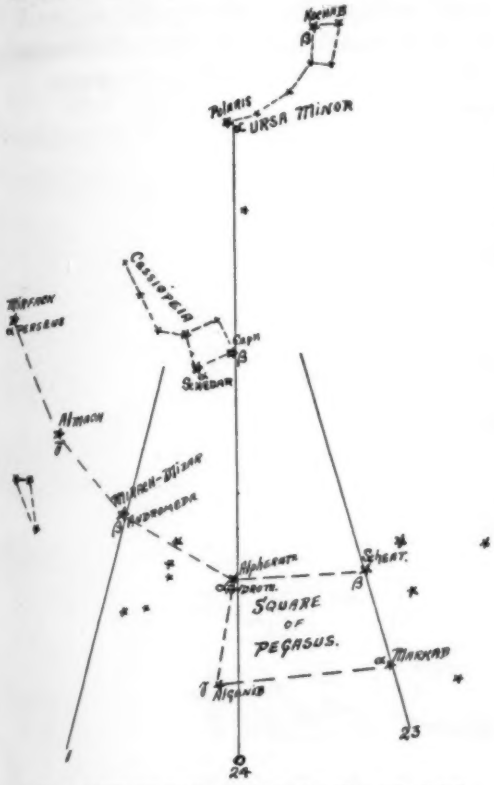


FIG. 4. LINE OF ZERO HOURS RIGHT ASCENSION
Showing stars from 23 hours to 1 hour right ascension lines

This method has been repeatedly used both north and south of the equator with equal success both by me and by other officers to whom I have explained the method during the past twenty-five years.

After some practice with this method of "picking the stars," you will subconsciously remember the coördinates of some of the stars and this knowledge will aid you materially in your study of the constellations.

I have found it of great assistance to divide the heavens into sectors:

Zero hours right ascension line

A line from Polaris just clear and to the right of Beta Cassiopeia (Caph) is the line of zero hours or 24 hours right ascension. This line continued to the southward about 30° of arc will just clear Alpha Andromedae (Alpheratz).

Six hours right ascension line

A line from Polaris just clear and to the left of Beta Auriga (Menkalinan) and Gamma Auriga is the line of 6 hours right ascension. This line continued on through Delta Auriga—a fourth magnitude star—gives you an absolutely straight line, parallel to and very close to the line of 6 hours right ascension. This 6-hour line passes to the left of Alpha Orion (Betelgeuse).

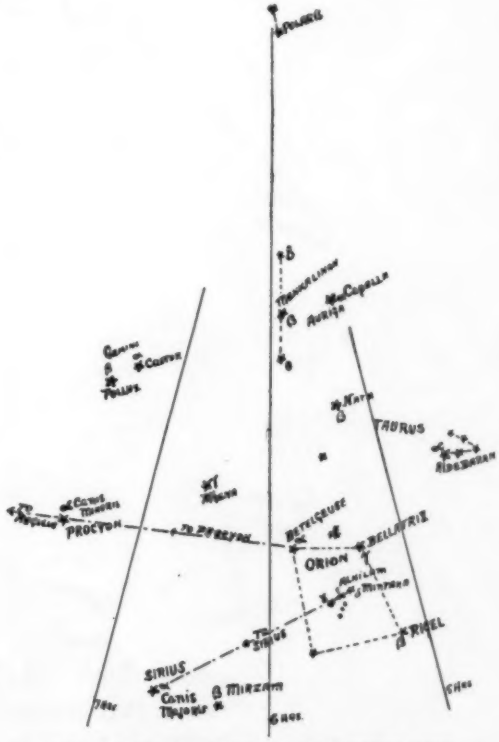


FIG. 5. SIX HOURS RIGHT ASCENSION LINE
Showing stars from 5 to 7 hours right ascension lines

Twelve hours right ascension line

The line from Polaris passing between Gamma Ursa Major (Phecda) and Delta Ursa Major (Megrez) is the line of 12 hours right ascension. The two stars in

Ursa Major referred to are the third and fourth stars in the big dipper; the first two stars, Alpha and Beta, being the pointers to Polaris. This line of 12 hours right ascension passes only 15′ of arc to the left of Beta Leonis (Denebola) which is the second largest star in the constellation of Leo, pointers of Polaris, Alpha, and Beta, Ursa Major, which are exactly on the line of 11 hours right ascension. By means of these two stars, it is very easy to tell the time of night without the use of paper or pencil, book or watch, and after a little practice you can tell the time within 5 minutes.

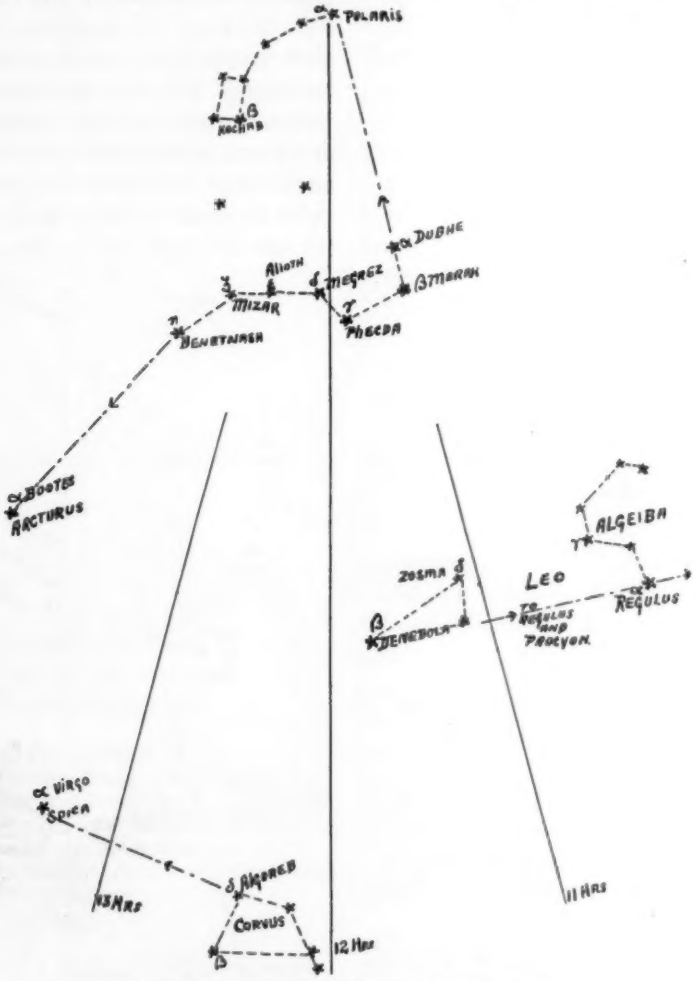


FIG. 6. TWELVE HOURS RIGHT ASCENSION LINE
Showing stars from 11 to 13 hours right ascension lines

and after crossing the celestial equator and passing to 20° south declination, just clears the star forming the heel of the mast of the ship's spanker in the constellation of Corvus.

Before passing on to the next quadrant, attention is invited to the position of the

Eighteen hours right ascension line

The line of 18 hours right ascension is not so well defined by any large star. However, a line from the second star in Ursa Minor; that is, the nearest star to Polaris, passing slightly to the right of Polaris and continued in the opposite

direction, will mark the line of 18 hours right ascension. This 18-hour line will pass within 0.5° of arc of the large star Alpha Lyra (Vega). If these lines outlining the four quarters are memorized they will very materially aid you in your star study.

are in an exact straight line. Remembering their right ascension, these two stars can also be used for telling the time at night very accurately—just like the two pointers of the big dipper.

Now having explained how to pick the

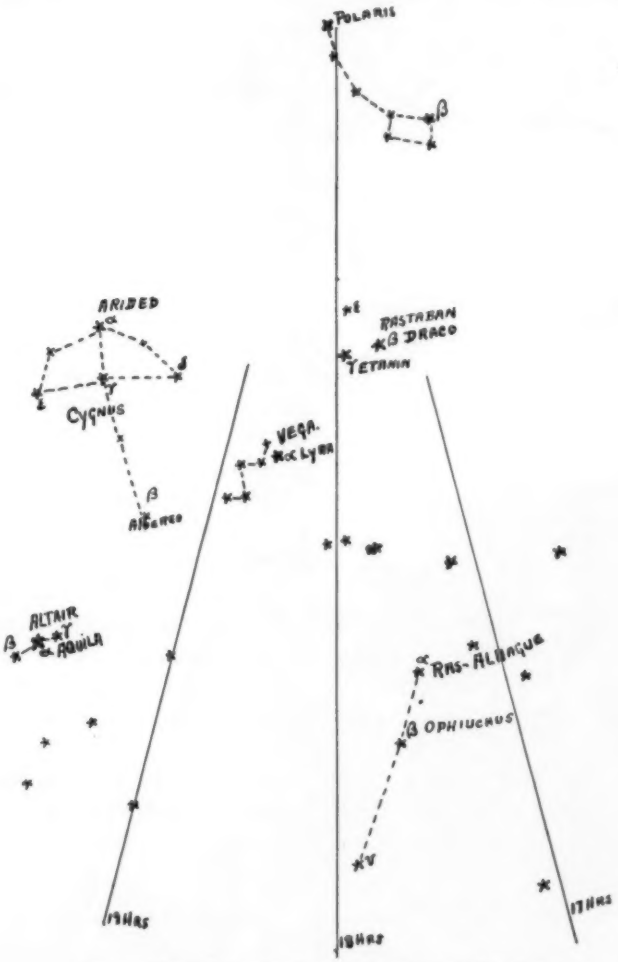


FIG. 7. EIGHTEEN HOURS RIGHT ASCENSION LINE
Showing stars from 17 to 19 hours right ascension lines

There are other stars which also are of considerable assistance if their right ascensions are memorized. For instance, Alpha Pegasus (Markab) and Beta Pegasus (Scheat) are exactly on the line of 23 hours right ascension. In other words, these two stars on one side of Polaris and the two pointers of Ursa Major on the other side

stars accurately and quickly, I will show one example of the practical application of the method.

In the late afternoon of June 23, 1931, you wish to know what stars you can use that evening at about seven o'clock. Fig. 8. You know that the right ascension of the mean sun is 6 hours. You therefore know

that at 7:00 P.M., when the mean sun is one hour below the western horizon, and with a right ascension of 6 hours, the first point of Aries will be 1 hour past the nadir. With that as your reference point, you can calculate that any star with 7 hours right ascension will be in the western

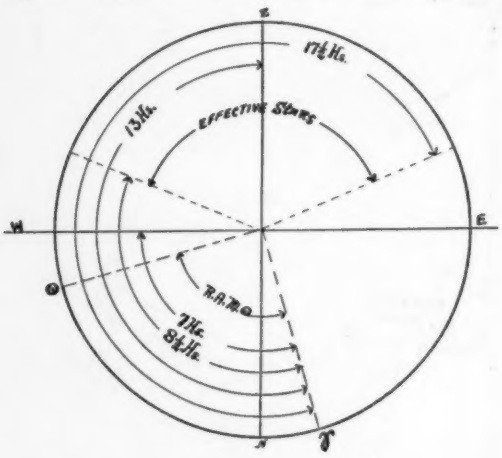


FIG. 8

Plan showing stars' right ascensions which are available for sights at that hour (7:00 P.M.)
Time: 1900 on June 23, 1931. L.S.T. 13 hours

horizon and a star with 19 hours right ascension will be in the eastern horizon; also that the right ascension of your meridian at 7:00 P.M. will be 13 hours which is your local sidereal time.

As it is not good practice to observe stars within an hour or an hour and a half of the horizon, your practical arc of observation is further restricted by an hour and a half approximately at the eastern and western limits, therefore your effective stars are between right ascension 8.5 hours and 17.5 hours. Your lowest altitude best star to the westward is therefore Regulus and to the eastward is Rasalhague. An hour later you will have Vega in excellent position to the eastward. At the same time (7:00 P.M.) Spica will be almost on the meridian to the southward.

Using the same time as an example, look in the *Nautical Almanac* and see what stars are included between 8.5 and 17.5 hours right ascension. You will see that Regulus is about halfway up in the western sky, that Denebola is about an hour and a quarter past the meridian, that Spica is about twenty minutes to the eastward of the meridian, Arcturus is about an hour to the eastward of the meridian, Alphacca an hour beyond Arcturus, and Antares an hour beyond that.

Knowing your latitude, you know the declination of your zenith, and therefore you can determine whether the declination of any star renders it unsatisfactory for your observation that night.

Having thus determined what stars you can use that night and their positions in the sky, you are fully prepared to go on deck at seven o'clock and make your observations without any loss of time as you know exactly where to look for each star.

★

IT IS THE DUTY of the officer constantly to repeat to those under his orders that a Navy exists in order to fight, perhaps tomorrow, and not for peace and regattas and harbor and fair-weather service. War—battle—we ought always to be thinking of these things, but in any case let us talk of them often, so as to be sure of thinking of them sometimes. Let us not be afraid of being regarded as bores harping on one string to the annoyance of their fellows. It is only by thinking of war that we can train ourselves for war—which is our duty—and only by speaking of it that we can train others—which is again our duty.—BAUDRY.

By Ewing Galloway, New York

LIGHTHOUSE ON THE OHIO RIVER

A beacon on the river near Vevay, Indiana.

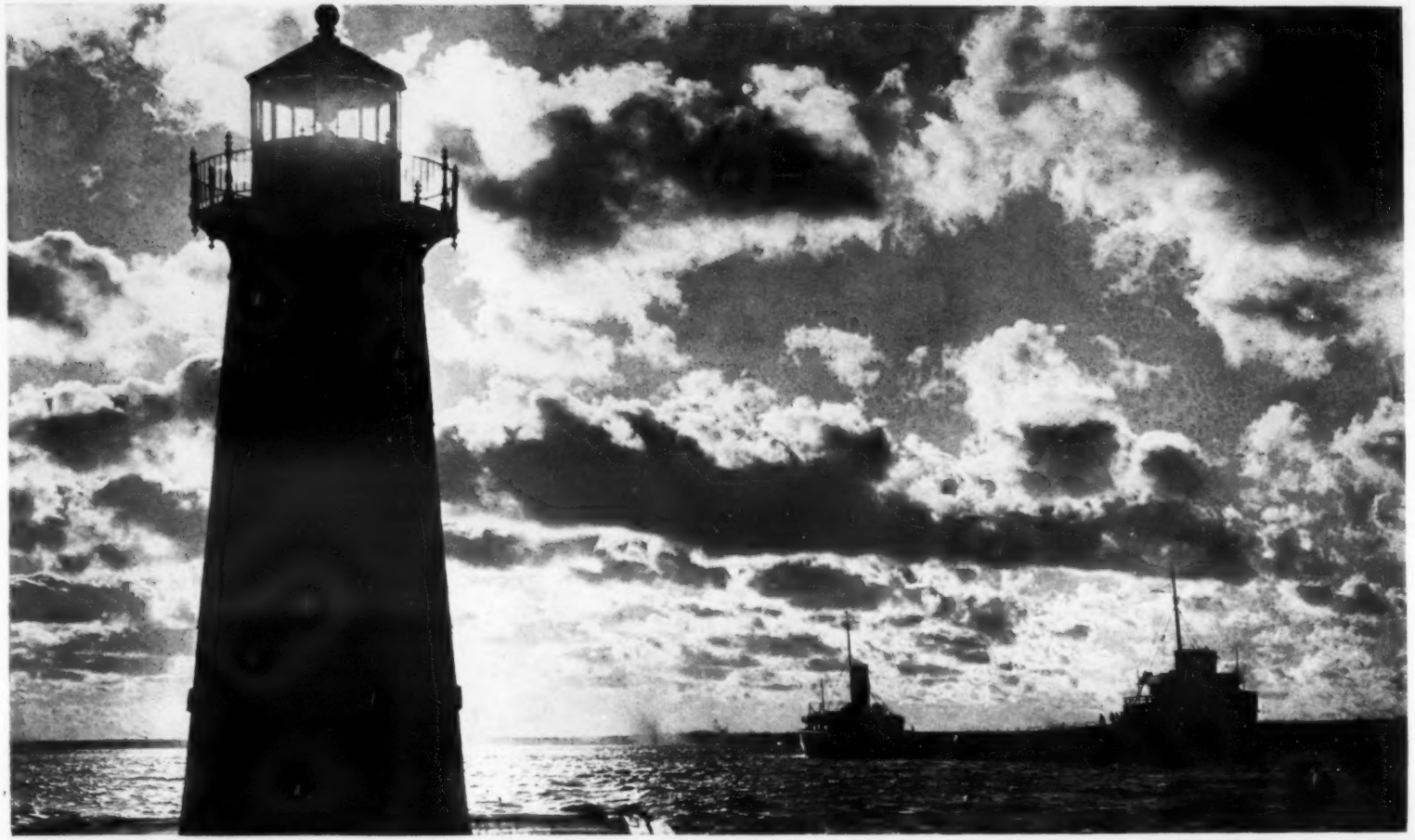
By Ewing Galloway, New York

A LIGHTHOUSE THAT ALSO SERVES AS A RADIO TOWER

This lighthouse at Cape Henry is one of the government's largest and newest types.

By Ewing Galloway, New York

LIGHTHOUSE ON THE DIKE AT WESTKAPELLE, HOLLAND

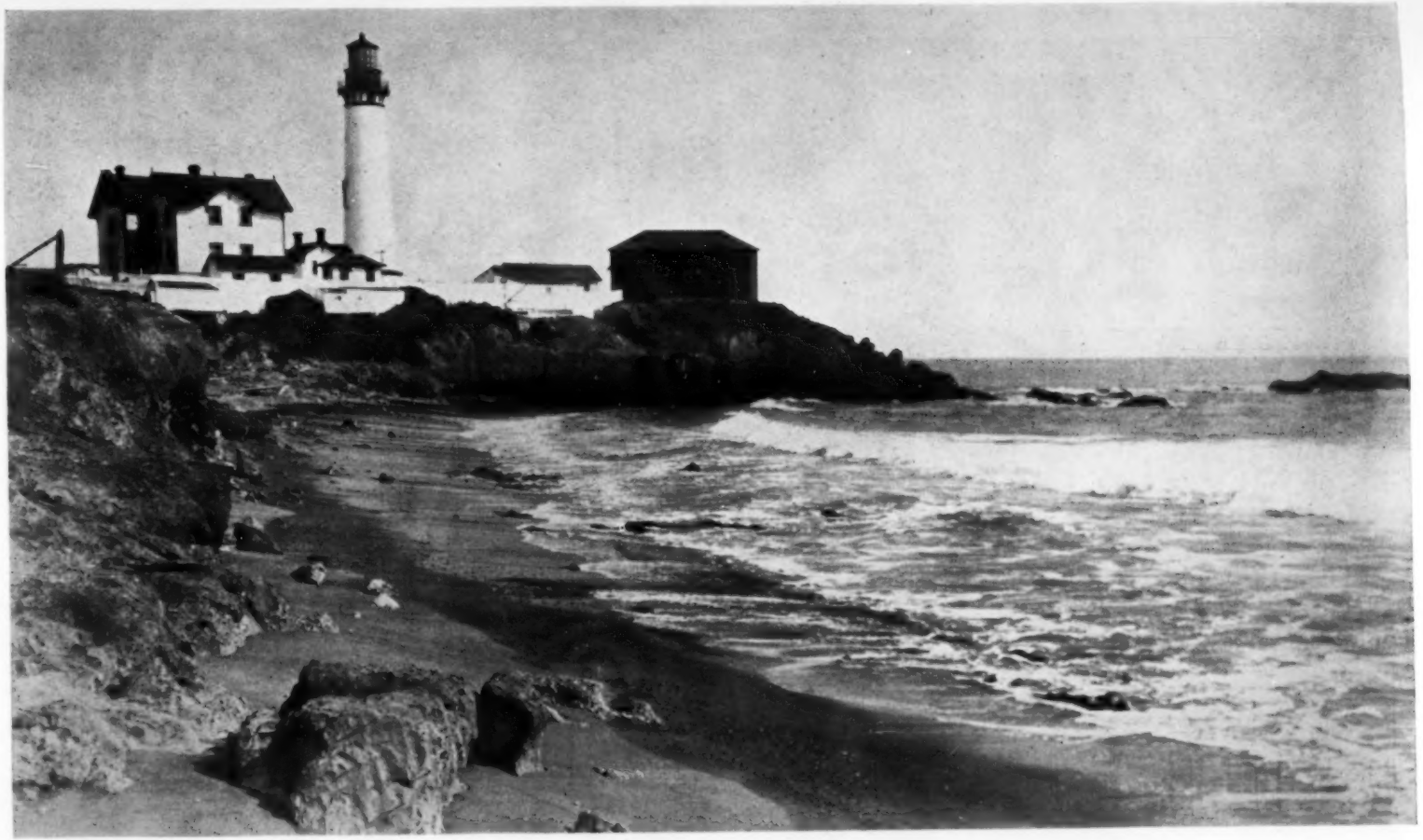


A. E. Young. From Ewing Galloway, New York

LIGHTHOUSE ON ST. MARYS RIVER, MICHIGAN
The large lake freighter is approaching the Soo Locks.

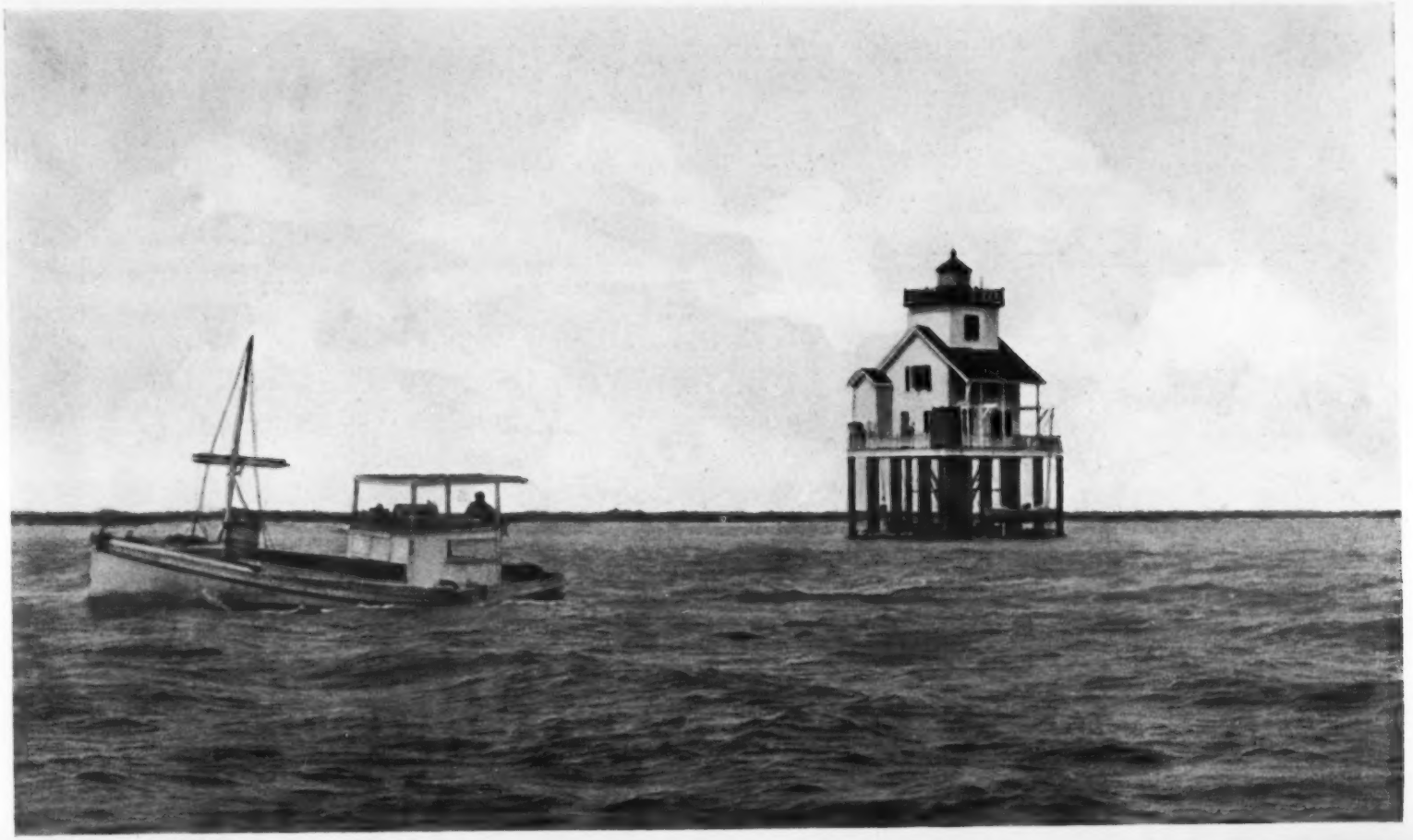
A. E. Young. From Ewing Galloway, New York

LIGHTHOUSE ON ST. MARYS RIVER, MICHIGAN
The large lake freighter is approaching the Soo Locks.



By Ewing Galloway, New York

PIGEON POINT LIGHTHOUSE, CALIFORNIA
This lighthouse is one of the main lights on the California coast. It was built in 1872.



By Ewing Galloway, New York

LIGHTHOUSE IN THE GULF OF MEXICO

By Ewing Galloway, New York

LIGHTHOUSE IN THE GULF OF MEXICO

A. H. Fischer. From Ewing Galloway, New York

LIGHTHOUSE AT CAPE MAGUARY IN THE DELTA OF THE MIGHTY AMAZON

CARRYING SUPPLIES TO A LIGHTHOUSE OFF THE COAST OF BRITTANY

From Ewing Galloway, New York

CARRYING SUPPLIES TO A LIGHTHOUSE OFF THE COAST OF BRITTANY

From Ewing Galloway, New York

A CRUISER PROGRAM

By LIEUTENANT L. A. KNISKERN (C.C.), *U. S. Navy*

BEFORE THE Washington treaty, the design of cruisers was influenced by the needs of the individual nations and the "styles" prevailing at the time, but it was limited only by financial considerations. Theoretically (assuming superhuman intelligence, including the ability to forecast naval needs) it was possible to design one or more "ideal" types and then build as many of each type as required for its specific purpose.

The Washington treaty first imposed limitations on cruiser design by fixing the maximum standard displacement at 10,000 tons and the maximum caliber of gun at eight inches. The London treaty provided two more limitations. First, it limited the gun caliber of a certain portion of our cruiser tonnage to six inches. Secondly, it established total tonnage limits on each of the subcategories of cruisers—the 8-inch and the 6-inch. This latter limitation—that of total tonnage in a given class—makes it necessary to consider not only what the "ideal type" for a given duty is, but how many of that type we should build without encroaching on the tonnage requirements of other types. This question is all the more important because the London treaty, in two or three cases, permits a certain amount of flexibility; and it becomes necessary to determine the most advantageous course to follow in each of these cases. For example, one of the flexible provisions is that which permits us to build "flight-deck" cruisers up to a total of 25 per cent of the total cruiser tonnage, i.e., about 80,900 tons. We must decide not only the optimum characteristics for such a ship, but also how many we should build.

This whole question of types and numbers is an exceedingly difficult problem, and is one on which a great many varying opinions will be found. This paper is not presented as a perfect solution to a knotty problem; it merely represents the personal convictions of one writer. Nevertheless, it is hoped that it will stimulate discussion. We all trust that careful consideration of the question now will lead to the adoption of a definite cruiser program which will ultimately give us the maximum value for our allotment of cruiser tonnage.

In attacking this problem it is convenient, first, to analyze the courses open to the United States under the London treaty; then to decide upon the characteristics of the types most needed by the Navy; and finally, to prepare a program which gives us adequate numbers of each type.

In this analysis we need consider only those ships which can be laid down up to December 31, 1936, the expiration date of the London treaty. The basic tonnage limits set by this treaty are for 8-inch cruisers, 180,000 tons; for 6-inch cruisers, 143,500 tons.

Under this treaty the following courses are open to the United States:

Course I. Build up to a total of eighteen 10,000-ton, 8-inch cruisers, using the remaining tonnage for "straight" 6-inch cruisers (as opposed to "flight-deck" cruisers).

Course II. Build up to a total of fifteen 10,000-ton, 8-inch cruisers, using the remaining tonnage for "straight" 6-inch cruisers, with the provision that the 30,000 tons of 8-inch cruisers not built may be exchanged for 45,498 tons of 6-inch cruisers.

Under either Course I or Course II "flight-deck" cruisers may be built instead of "straight" 6-inch cruisers, to a total of

about 80,900 tons. For convenience in discussion these will be treated as two separate courses, defined as follows:

Course III. Same as Course I, with the substitution of a certain number of "flight-deck" cruisers for "straight" 6-inch cruisers.

Course IV. Same as Course II with the substitution of a certain number of "flight-deck" cruisers for "straight" 6-inch cruisers.

The treaty permits a transfer of destroyer tonnage to 6-inch cruiser tonnage to the extent of 10 per cent of the 6-inch cruiser tonnage, that is 14,350 tons. This might be highly desirable, but may be disregarded here as the option may be exercised under any one of the aforementioned courses.

We have built and operating ten cruisers of the *Omaha* class, two of which may be replaced by ships to be laid down prior to December 31, 1936. Thus we have eight *Omahas* of a total standard displacement of 56,400 tons. There remains a total of 143,500 minus 56,400, or 87,100 tons to devote to new 6-inch cruisers under Course I, or 132,598 tons under Course II.

The question of size enters the problem. For reasons to be discussed later, 7,200 tons is taken as the minimum size. The maximum, by the terms of the treaty, is 10,000 tons. For simplicity only two sizes, 7,200 and 10,000 tons are considered.

We are permitted to build 80,900 tons of "flight-deck" cruisers. In order to secure all the necessary features such ships will require the full 10,000 tons allowed. We may build eight units of this type as a maximum and, for reasons to be stated later, we may set a minimum of two units.

The following table shows our total cruiser force possible under the various courses open to us, with subcourses providing for the choice of the 7,200- or the 10,000-ton, 6-inch cruiser.

The figures for surplus tonnage are given to show how nearly each subcourse uses up the total allowed tonnage. This tonnage does not need to be wasted. In the subcourses where 7,200-ton ships are considered, the surplus could be spread over these ships to make each a little larger, but still in the same general class as far as military characteristics are concerned. It must be remembered that additional tonnage cannot be added directly to useful weight, such as armament or protection. If, for example, 300 tons be added to the displacement, only from 125 to 150 tons can be added as useful weight. The remainder goes into hull weight to support the added useful weight. In the three cases where 7,100 tons remain as a surplus this would probably be used for an additional vessel, either a "straight" 6-inch cruiser, or some special type for a particular service. The surplus of 2,598 tons remaining in three cases might also be used in some such manner, but the need for a special

	Course I		Course II		Course III			Course IV			
	a	*b*	*a*	*b*	*a*	*b*	*c*	*a*	*b*	*c*	*d*
8-inch cruisers	18	18	15	15	18	18	18	15	15	15	15
6-inch 7,200-ton	12	—	18	—	—	9	—	7	—	15	—
6-inch 10,000-ton	—	8	—	13	—	—	6	—	5	—	11
6-inch flight-deck cruisers	—	—	—	—	8	2	2	8	8	2	2
Omahas	8	8	8	8	8	8	8	8	8	8	8
Total units	38	34	41	36	34	37	34	38	36	40	36
Surplus tonnage	700	7,100	2,998	2,598	7,100	2,300	7,100	2,198	2,598	4,598	2,598

ship of this size would be considerably less. In any case, in the discussion which follows the general considerations involved are considered to outweigh any consideration of the distribution of surplus tonnage.

Characteristics of types.—One of the first questions which confronts us, in looking over the courses open to us, is whether we should include "flight-deck" cruisers in our program. This type has been roundly criticized, and staunchly supported. An entire paper could well be devoted to a discussion of the advantages and disadvantages of this so-called "hybrid," but the subject must be treated very briefly here. It is merely intended to point out a few facts which are considered to justify the inclusion of such a type in our cruiser program.

In the first place, to fall within the limits of the treaty, such a ship must be primarily a cruiser—she must have cruiser speed, cruiser protection, and above all cruiser battery. It may not be the maximum cruiser battery, but it must be a good substantial battery for a cruiser of its size. This statement is meant to include the anti-aircraft battery, which should be similar to that installed on the best modern cruisers. So much for the cruiser features. Now if we endow such a ship with a flight deck and a good complement of planes we have a powerful cruiser with "long arms" and greatly extended vision. We hear it argued that in bad weather she would be unable to use her planes. This is granted, but in such weather she is still essentially a cruiser. In good weather she has the tremendous advantage of long range of vision and additional striking power. Success in battle often lies in being able to take advantage of a favorable opportunity. The advantage of a large number of planes to a cruiser engaged in locating enemy commerce raiders, in patrolling commerce lanes, or in strategical scouting can hardly be overestimated. She has the advantage over cruisers with catapults in being able to keep a continuous patrol of planes in the air and in the ability to land planes without stopping and operate them in weather when seaplanes could not come alongside to be picked up. The only other way that these advantages can be obtained is by sending an airplane carrier with each cruiser, and this would obviously necessitate more carriers than we are permitted under the treaty.

For excellent discussions of the possible uses of flight-deck cruisers the reader is referred to an article by Lieutenant Commander Sherman in the November, 1930, issue and a discussion by Commander Turner in the May, 1931, issue of the Naval Institute PROCEEDINGS.

Another point to consider in connection with flight-deck cruisers is that possible developments in aëronautics may permit the use of a smaller flight deck than is now contemplated, thus giving improved cruiser characteristics with the same aviation facilities. Consider the advantages which might accrue to such a ship if the autogiro were found to be practicable for naval uses.

However, all these advantages cannot be had for nothing. There must be a sacrifice in one or more of the cruiser characteristics. Furthermore, it must be recognized that this is a new type, never actually built and tested in service. It would be rather a bold prophecy to state at this time that the advantages will greatly outweigh the disadvantages. But the converse is equally true. The type gives great promise of being a valuable adjunct to the fleet, and the possible advantages are considered so important that we should not be satisfied until it has been built and thoroughly tested. Service tests of any type invariably lead to improvement. Service tests of this type may lead to such improvement as to dispel all doubt as to its value. For this service test, it is considered advisable to include only two of these ships in our present program. Two are specified because with two ships we can make parallel

installations of two types of gear—elevators—for example, and determine the better from actual service. We can also obtain service reports from two sets of personnel operating under different conditions and accelerate the test. Having built two such ships, the end of 1936 would be about as soon as we could hope to have conclusive reports on their performance. Further ships of this type would then be laid down in 1937, and would fall outside the limits of the present discussion.

With two flight-deck cruisers established in our program we have narrowed the problem down to a consideration of the courses shown in the tabulation as Course III (b) and (c), and Course IV (c) and (d). That is to say, we now have to choose between eighteen 8-inch-gun cruisers with six to nine new 6-inch cruisers, or fifteen 8-inch-gun cruisers with eleven to fifteen 6-inch cruisers. This problem, of course, opens up the whole question of cruiser duties and the best type for each duty.

As a motto for an article entitled "The Cruiser Problem" in the Naval Institute PROCEEDINGS for May, 1930, Lieutenant Percival chose the following quotation from Mahan: "In the designing of a cruiser as of any class of warship, the first step before which none should be taken is to decide the primary object to be realized—what is the ship meant to do?" This is indeed an admirable principle and none of us could question it. Yet how many cruisers have been designed with a label attached "This ship is intended to perform solely, or even primarily, such and such duties." The cruiser, by its very nature, is a "Jack-of-all-trades"—the diversity of its uses is only exceeded by the diversity of opinions regarding its characteristics for those uses.

A study of articles appearing in the Naval Institute PROCEEDINGS during the past ten years reveals some very interesting things; first, the wide diversity of opinion on cruiser design, and, second, the fact that very few writers attempt to prescribe definite types for definite cruiser functions.

A brief review of the conclusions of some of these writers should be worth while.

In an article entitled "The Cruiser" in the issue of April, 1926, Lieutenant Webster lists cruiser duties as follows (omitting certain very special duties such as mine laying):

(a) The destruction of enemy commerce
(b) The protection of commerce
(c) Showing the flag (peace time)
(d) Dispatch and communication service and patrol duties of various kinds
(e) Raids—bombardment of enemy coasts etc.
(f) Blockade
(g) Scouting for a fleet
(h) Beating off enemy destroyers
(i) Supporting our own destroyers
(j) Torpedo attack (which should be no logical function of a cruiser)

Without attempting to specify the type of ship to be assigned to any given duty Lieutenant Webster summarized his conclusions as follows:

The vital requirements of any cruiser are seaworthiness, speed, radius, cheapness, which represents numbers, and hitting power.

These requirements would seem to be best met by building cruisers of two types:

(a) Numerous ships—as small as consistent with the above
(b) A number of cruisers that are as powerful as may be built

In an article entitled "Cruiser Types" in the issue for March, 1927, Lieutenant Percival arrived at three distinct types, as follows:

(1) The destroyer scout, similar to the destroyer leader, but of about 3,000-ton displacement

Proposed duties:

(a) Scouting
(b) Torpedo attacks, counterattacks
(c) For conversion to carry coastal motor boats or mines
(d) Raiding convoys or communication lines

(e) Gunboat duty
(f) Escorting light mine layers or motor boats
(g) Destroyer leader duty

(2) The armored cruiser; 10,000 tons; 8-inch guns; ample protection against 8-inch; 25 knots speed.

Proposed duties:
(a) Fleet screening
(b) Support to destroyers and scout cruisers
(c) Ocean escort
(d) Fleet flagship
(e) Towing damaged vessels
(f) Protecting aircraft carriers

(3) The scout cruiser; large, fast, heavily armed but scantily protected.

Duties:
(a) Scouting
(b) Commerce protection
(c) Escorting light mine layers or motor boat carries
(d) Screening aircraft carriers
(e) Raids in force on lines of communication

The same author in an article entitled "The Cruiser Problem" in the issue for May, 1930, proposed the following types:

(1) The battle cruiser type; 10,000 tons; six 8-inch guns, nine 5-inch guns; 28–30 knots speed and reasonable protection against the 8-inch gun.

Duties:
(a) Scouting
(b) Supporting or breaking up destroyer attacks
(c) Raiding
(d) Hunting

(2) The battleship type; 10,000 tons, ample protection against 8-inch shells, nine to twelve 8-inch guns, 21–25 knots.

Duties:
(a) Protecting convoys
(b) Screening the fleet at night or in thick weather
(c) Protecting aircraft carriers during an action
(d) Breaking up destroyer attacks

(3) The aircraft carrier type; which is actually a 10,000-ton carrier, and not permitted to be built out of cruiser tonnage under the London treaty.

(4) The destroyer type; primarily torpedo craft of small displacement.

(5) The submarine type; actually submarine cruisers, and hence not pertinent to the present discussion.

There have been many other articles and discussions on general cruiser characteristics—too many to review even briefly. One discussion, however, is quite pertinent to the present article. In discussing Lieutenant Percival's first article, Captain H. C. Dinger says: "Is it better to have half a dozen different types, as the author seems to think, or one type that, after due consideration, appears best to meet cruiser needs? I think the answer is, one type, unless we are to build more than twenty."

In an article entitled "Light Cruisers" in the issue for September, 1926, Captain Howard reaches the same conclusion. He divides cruiser duties into two general parts: "operations with or in connection with the fleet, and independent operations." After a complete and searching analysis including a thorough review of independent cruiser operations during the World War he states his conclusions as follows: "The studies carried along quite separately for two types have brought exactly the same conclusion in each case. A light cruiser in whatever rôle she is placed must be a fighting vessel." And later, "Finally then, whatever the work in hand may be the cruiser must be first and last a fighting ship, possessed of the best all-around fighting qualities possible to obtain on the displacement of 10,000 tons."

We may argue for a single type of cruiser without contending that it is impossible to prescribe certain types for certain duties. Indeed it must be conceded that a careful analysis might yield a very definite "ideal" type for each duty, from a theoretical standpoint. Furthermore, a commander in chief might be very glad to push a button and have the ideal type for

his immediate need appear at the psychological moment. But naval warfare is not conducted that way, and we must provide the best average type for the best average duty. Captain Howard expressed this point very strongly when he said "Even if two types were needed, no country . . . is rich enough to build double the number of warships actually needed, simply to have two types to meet two conditions. Even if such were done the vessels of the type wanted would undoubtedly be in one place just when the other type was wanted there."

It is proposed, then, that our present problem is not one of designing "ideal" types to perform theoretical duties; but the very definite practical problem of allotting our remaining cruiser tonnage to secure the maximum fighting value under average cruiser conditions. This means getting the best combination of numbers of ships, numbers of guns, and "fighting strength" of individual units. The "fighting strength" of a unit depends on the number and size of guns, volume of fire, protection, speed, radius, and to a certain extent maneuverability.

Let us consider first the 6-inch cruisers. Early in the article 7,200 tons was set as the lower limit. It is doubtful if all the military characteristics we would want, even for a small cruiser, could be attained on much less than this. Even if we set out to design a 6,000- or 6,500-ton cruiser it is probable that the pressure would be so strong for increased armament or protection, or habitability, or all of these, that the displacement would increase materially before the ship was finally designed and constructed. Hence the lower limit of 7,200 tons was set as a basis for discussion. The upper limit is set by the treaty at 10,000 tons. The speed of the two types is assumed to be the same, as there is a remarkable tendency for all nations to approach a standard cruiser speed of about 32 knots.

A complete comparison of the fighting strength of an equal tonnage of these two types can only be had, in the last analysis, by opposing one group against the other in actual battle. It is the old, old question of a large number of small ships against a smaller number of large ships; and any solution may well be open to the criticism that it is "theoretical," and even "fallacious," especially if the critic happens to be of the opposite school of thought. Nevertheless a comparison of the elements of fighting strength appears to be the best means at hand of deciding the question.

In the first place, a fact not generally recognized is that on a 10,000-ton cruiser there is available for battery, ammunition, and protection some 4 per cent to 5 per cent more displacement than on a 7,200-ton ship of the same speed. Thus, if we take ten of the small ships and seven of the large ships (approximately equal tonnage) we have 4 per cent of 70,000 or 2,800 more tons to devote to protection, battery, and ammunition in the large ships than in the small ships. In addition it works out that the cruising radius of large ships will be somewhat greater than that of small ships.

The first element of fighting strength listed was number and size of guns. Since we are discussing only the 6-inch cruisers at present, we need only compare the numbers. On the 10,000-ton ship we would probably not mount more than four triple turrets, if for no other reason than space considerations. On the 7,200-ton ship we may reasonably assume nine guns. For the example given above this gives a total of eighty-four guns on the large ships and ninety on the small ships.

The second item listed is volume of fire, which, since the gun size is the same, is in direct ratio to the number of guns.

The third item is protection. As they have greater capacity for carrying military load the larger ships can be well protected against the 8-inch gun whereas the

small ships can only be protected against the 6-inch gun.

The fourth item, speed, has been assumed the same in both cases.

The fifth item, radius, is definitely greater in the larger ship.

The last item, maneuverability, is generally accepted to be better in smaller ships. But it must be remembered that the difference in length between a 7,200-ton ship and a 10,000-ton ship is not great, so the difference is not great.

The above comparison is not needed to prove that a 10,000-ton cruiser is a better fighter than a 7,200-ton cruiser—that should be obvious. But it does give us a basis for comparing groups of equal tonnages of these types. Taking the example given of 72,000 tons of small cruisers compared with 70,000 tons of large cruisers we have the following table:

	7,200-ton units	*10,000-ton units*
Number of units	10	7
Number of guns	90	84
Volume of fire	90	84
Protection	against 6″	against 8″
Speed	equal	—
Radius	—	superior
Maneuverability	slightly superior	—

Thus we find on all counts but protection and radius that the smaller ships have a slight superiority. The matter of number of units is a very real advantage, especially for employment on independent duty. But we must remember that going too far in this direction leads to the policy of the *Jeune Ecole*, long since abandoned in France. Would our choice of 7,200-ton cruisers be going too far? Could we afford to purchase three or four more units at the price of inadequate protection for all units?

One of the best papers recently published on the matter of protection is that by Professor Hovgaard entitled "The Relation between Armament and Protection in the 10,000-ton Cruisers and the *Ersatz Preussen*," reprinted in the Naval Institute PROCEEDINGS for December, 1929. His discussion of this subject is strongly recommended to all who are interested in the theory of protection, particularly to those who are inclined to minimize its value. Especially valuable are his quotations from Jellicoe's *The Grand Fleet*. Professor Hovgaard's statement of the "principle of corresponding protection," which is well substantiated by experience as well as logic, is as follows: "An artillery ship should be so protected that it can keep up a sustained fight under average conditions with a ship of similar size and type and carrying the same armament." In developing this principle, however, he states, "In order to arrive at a rational design of the protection it is necessary to make assumptions as to the adversary which the ship is destined to fight, in particular as to the caliber of his guns."

It is here contended that in the particular case of the 6-inch cruisers this principle of corresponding protection should be interpreted to provide protection against the 8-inch gun. It must be remembered that at present the 8-inch cruisers in the navies of the four treaty powers (excluding the United States) number about 40 per cent of the total. This does not necessarily mean that the 6-inch cruiser has a 40 per cent chance of meeting an 8-inch cruiser; it does mean that such chance is appreciable. It may not be entirely within our power to pit 6-inch cruisers against 6-inch cruisers and 8-inch ships against 8-inch ships, especially on independent missions. Now a 6-inch cruiser with inadequate protection can scarcely be credited with any chance of survival against an 8-inch cruiser, whereas, with adequate protection against the 8-inch gun, this ship may, by superior skill, have a fair chance of disabling the enemy and of coming out of the engagement with enough ship left to accomplish its mission. Another point must be empha-

sized in this connection. In providing protection for a chance encounter with the 8-inch ship we also provide an increased margin of safety against the 6-inch ship. Light cruiser protection, at best, can only be effective within certain rather narrow "zones of immunity" and all we can do to widen those zones will give just so much more liberty of action to ship and force commanders in time of battle.

Other arguments might be advanced for the larger size. Professor Hovgaard, in his *General Design of Warships* states as part of his conclusion to the chapter on "Size of Warships"—"The foregoing discussion shows that larger ships, quite apart from their greater carrying capacity, possess inherent nautical, technical, military, and economic advantages, which render them intrinsically superior to smaller." But, for the case in hand, it is considered that the question of protection alone is sufficiently important to be the determining factor.

With 10,000 tons set as the optimum size for 6-inch cruisers we now have to choose between eighteen 8-inch cruisers with six 6-inch, and fifteen 8-inch cruisers with eleven 6-inch. Here indeed is a much more perplexing problem. Based on the foregoing reasoning we should naturally expect the decision to lie with the 8-inch ship, as representing the more powerful battery. But here we have a special clause in the treaty to consider. By building the 6-inch cruisers we are allowed approximately 15,000 more tons than by building the 8-inch cruisers. Referring to the original tabulation of units under Course III (c) our new construction would consist of three 8-inch cruisers; six 6-inch, 10,000-ton cruisers; two flight-deck cruisers; and 7,100 tons of surplus tonnage, which we may here evaluate as approximately three-quarters of a 6-inch cruiser. Under Course IV (d) the new construction would consist of no 8-inch cruisers; eleven 6-inch, 10,000-ton cruisers; two flight-deck cruisers; and only 2,598 tons of surplus tonnage, which we may neglect. The difference between the two courses, then, is three 8-inch cruisers in favor of Course III (c) and four and one-quarter 6-inch cruisers in favor of Course IV (d). (The actual difference in 6-inch, 10,000-ton cruisers is five in favor of Course IV (d), but to allow for the existence of greater surplus tonnage under Course III (c) we may call this figure four and one-quarter.) In comparing these 8- and 6-inch cruisers, ship for ship, we must remember that they have approximately the same protection, same radius, same speed—in short, are the same in all respects except battery. The latest 8-inch ships have a battery of nine guns, and the 6-inch cruisers are assumed to have a battery of twelve guns. The actual weight of metal thrown per salvo is more for the 8-inch-gun ships; the penetrative effect of the 8-inch shell is greater against vertical armor and slightly greater against horizontal armor; the 8-inch gun has the advantage of range. However, the 6-inch gun has greater rapidity of fire, which in many cases may be a great asset. It also has a greater number of guns per ship, which makes for greater accuracy of fire, at least for one group of guns, in case of divided fire. If some of the foreign cruisers are as lightly protected as they are reported to be, the 6-inch cruiser would undoubtedly be very dangerous to them.

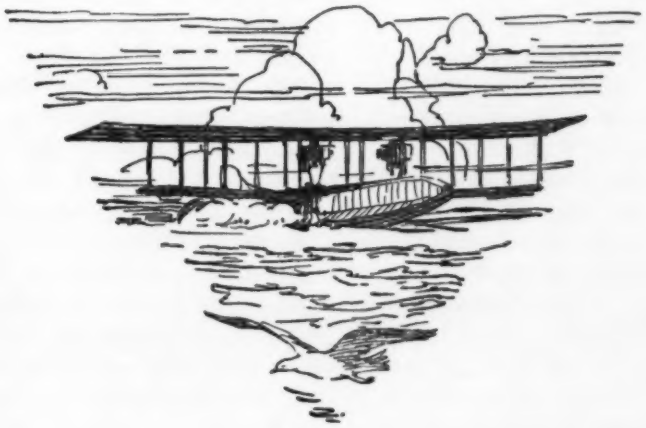
Proponents of the 8-inch cruiser may well, on the basis of the comparison set forth above, claim superiority for a single 8-inch ship against a single 6-inch ship, under certain conditions. But since the 6-inch is well protected against the 8-inch gun she would have quite a fair chance against the 8-inch ship under certain methods of conducting the fight. Certainly the difference is not nearly so appreciable as that in the comparison previously made between large

6-inch and small 6-inch cruisers. Now when we come to compare not equal tonnages of these ships, but unequal tonnages as allowed by the treaty, it would seem to be to our advantage to take the eleven 6-inch, 10,000-ton ships, in preference to three 8-inch ships plus six 6-inch (plus one "extra number" of 7,100 tons). In this way we utilize our allowed tonnage, almost to the last ton, in powerful, homogeneous fighting units.

The program finally proposed then is as follows:

		New construction
8-inch, 10,000-ton cruisers	15	—
6-inch, 10,000-ton cruisers	11	11
6-inch, flight-deck cruisers	2	2
Omahas	8	—
Total units	36	13

This compares with a maximum possible number of practical units (7,200 tons and above) of forty-one and has the advantage of being composed of powerful, well protected "straight" cruisers, plus two flight-deck cruisers which give promise of having great strategic value.



AN ARMY which preserves its usual formations under the heaviest fire, which is never shaken by imaginary fears, and in the face of real danger disputes the ground inch by inch, which, proud in the feeling of its victories, never loses its sense of obedience, its respect for and confidence in its leaders, even under the depressing effects of defeat; an army with all its physical powers, inured to privations and fatigue by exercise, like the muscles of an athlete; an army which looks upon all its toils as the means to victory, not as a curse which hovers over its standards, and which is always reminded of its duties and virtues by the short catechism of one idea, namely, the honor of its arms:—Such an army is imbued with the true military spirit.—CLAUSEWITZ.

THE POLISH CORRIDOR

By COMMANDER BRUCE R. WARE, JR., *U. S. Navy*

THE POLISH CORRIDOR is the direct result of President Wilson's declaration in his fourteen points that Poland must have access to the sea over its own territory. At the peace conference, Poland, in the face of British as well as German resistance, was given a strip of land that divided the Germany of 1919 into two geographical parts. This strip of land spoken of as "The Polish Corridor" has a shore line on the Baltic Sea west of the Free City of Danzig, and extends northward from Upper Silesia, separating East Prussia from Germany.

Thus, after a captivity of 150 years, Poland, in addition to regaining its own independent political life, has had restored to it a seacoast. In so gaining access to the sea, Poland increased its territory by an area of 6,000 miles. Erased from the map of Europe in 1772, when Frederick the Great took its land in the first Polish partition, Poland had become but a legendary name to the great majority of people, even to those well informed in politics.

The territory which is now called Poland has been occupied by its people from times which even archaeologists cannot determine. The country, being surrounded by swamps and forests, was untouched by the hordes of barbarians who made inroads into Europe in the early ages. Later, however, the Slav peoples living farther east and west, were overwhelmed by Asiatic invaders. Then Poland undertook the defense of Europe, and again and again drove back the hosts of Turk and Tartar, as for instance, when the Poles under King Sobieski destroyed the power of the Turks under the walls of Vienna in 1653.

Thus forced constantly to defend themselves, the Poles, an agricultural people, were welded together. It is exceptional that they did not become a war-loving or a conquering nation. The people united to improve their government, and developed a true republican spirit of freedom and tolerance; they were patriotic and betrayed an unusual respect for human rights and ideals. They upheld a government "for the people, by the people." Throughout its early days, Poland was frequently obliged to quell disturbances on its eastern borders. The Russian Empire, rising from the remnants of the Tartar tribes and taking from them their military lust for aggression, did not give the Poles an opportunity to defend themselves against the fast growing power of the Teutonic Knights to the west. Unhindered, East Prussia became established on Polish territory, to become the leader of the German states, and filled with ambition to dominate the world. The growth of these neighbors, empires where absolutism and ideas of conquest ruled, placed Poland geographically in a singular position. To these empires, Poland opposed its high ideals and its armies and united its forces with those of the weaker nations of Europe. This policy brought about a number of alliances—with Lithuania against the aggressions of the Teutonic Knights and of Russia; with the Bohemians and Hungarians against the attacks of the victorious Turks and against the attacks of the Austrians. Poland defended Latvia against Russia; and with the patriotic Ruthenians it founded a free Ukraine, independent of the former oppressor, Russia.

Their own unhappy conditions made all Poles sympathize with any nations strug-

gling, as they were, for democratic government and republican freedom. For this ideal Kosciusko took part in the American Revolution; for the French idea of republican freedom the Polish legions fought under Napoleon in Italy, in Germany, and in Russia. During the World War, Poland opposed the three great powers who were its hereditary enemies. After the downfall of Russia, Germany, and Austria, Poland regained her freedom. Though defeat had brought many changes in the governments of the defeated nations their national tendencies still remain. If Poland, by maintaining its high ideals, by maintaining friendly relations with the defeated powers, can so influence them that they will turn to the true democratic ideals of justice and right, then we may safely conclude that in restoring Poland to her rightful place among European nations, a safeguard for peace has been created. To this great task, Poland has heartily devoted herself, and the past decade has been replete with concrete evidence of her good faith.

However, in thus restoring Poland and in giving her access to the sea, there has been thrust into the calm of Europe the perpetual problem of the corridor. A glance at the map will assist in understanding the live importance of this danger spot to the peace of Europe. East Prussia has become a dismembered thumb of Germany. It has already commenced to wither, and with it is withering the influence of Germany on the area between Danzig and the Gulf of Finland. Furthermore, there exists today the indisputable fact that East Prussia is gradually being absorbed by Poland. This is a constant hurt to German pride and it is extremely doubtful if any German government or party can long continue to accept the *status quo* and the present frontiers. The corridor, therefore, forms the fundamental issue between Germany and Poland, and the main question is whether the outcome of the treaty of Versailles is conducive to European peace or not.

The political atmosphere of Europe is full of brimstone. The press of Europe, England, and America is full of the pros and cons of the *status quo*. Writers of articles and publications seem to compete with each other in selecting bellicose titles under which to discuss the part that Poland is now taking in the politics of Europe. For example, one reads: "The Battle of the Ports" (referring to Gdynia and Danzig), "Poland's Westward Trend," "Poland's Reign of Terror," "The Polish Corridor," "A Danger Spot to Europe," "The Corridor, Indispensable to Peace," and, "Poland Makes Good."

Likewise, from Poland come bellicose political and journalistic bloodlettings. One Polish author, Stanislav Bukevieki, in his *Poland's Task in East Prussia*, writes: "From what has been said it follows that the mutual relations between Poland and Germany will for a very long time remain hostile." Another author goes a step further. Again Grabski, professor of political economy in Lemberg University, in his pamphlet on "Poland's Trend to the Baltic and the Oder," writes:

> The German tendency to expand in the direction of Poland is the same as it always has been. Does any one believe that Germany has permanently acquiesced in the loss of the industrial district of Upper Silesia, and in the severance of East Prussia from the rest of Germany by the corridor? If so, he is either blind or he declines to see the real facts in the case. The decision of the East Prussian problem which was given by the treaty of Versailles is too artificial to be permanently maintained. Poland can exist without having access to the Dnieper, but without permanent access to the sea she cannot exist. This is the decisive point of view. . . . But Poland, on account of the Baltic coast, will sooner or later clash with Germany.

In regard to the access to the Baltic Sea, there is no question but that time is working on the side of Poland. Day after day witnesses the departure of Germans from East Prussia to the more prosperous

homeland. As the Germans emigrate, the Poles move in. The longer this goes on, the longer the opportunity for Poland to run its own affairs, and the longer Poland remains unmolested in carrying out its policies toward winning over East Prussia, the weaker the German case for frontier revision will become. From a German source we find the most concrete evidence in behalf of the *status quo*. Dr. Hellmuth von Gerlath, president of the German League for the Rights of Man and Citizen, recently made the following statement: "From the international point of view, there is no possible ground for discussion of a rectification of our eastern frontiers, which would amount to annexation pure and simple."

This statement is supported by the map studies of the historical shifting of the frontiers of Poland, from the time of its greatest extent in 1654 through the period of its captivity to its reëstablishment by the peace conference. A solution of this dangerous question of the Polish frontiers cannot be found in history—exhaustive research of the history of Europe has produced arguments equally favorable to each side and the pendulum of justice may be made to swing from one to the other. If the case admitted, a clear decision would have been discovered by the many eminent statesmen who have reviewed the conflict in the status of impartial neutrals. The threads emerging from the tapestry of history cannot be unraveled, and it appears to enter into an endless argument as to which side has the better claim. It is the purpose of this article to produce a "balcony" from which to observe the progress of events.

Although the past speaks with two voices, the fact that the election returns to the Segm (Lower Polish House) recently showed that the German minority in the area covered by the so-called corridor made up but 15 per cent of the total vote polled. The Polish census of 1927 accounted for 850,000 Poles to 120,000 Germans in that area. A review of this census and the one taken just after the war, develops the fact that over 300,000 Germans have left this area and their places have been taken by Poles. No one can dispute the fact that the Polish corridor is now unmistakably Polish.

At the rebirth of the Polish nation as a country with definite frontiers, the statesmen returning her to a place in the world failed to, or at least did not, place within her boundaries the mouth of the Vistula river. This river is the "Mississippi" of Poland. At the mouth of the Vistula is located the Free City of Danzig with its population 90 per cent German. Before the World War, the lines of trade ran east and west, Danzig flourished. The Free City was an important seaport on the Berlin-East Prussia line of communication, rail or water, to Konigsberg.

President Wilson, insisting that Poland have access to the Baltic, abruptly removed or lifted up a section of this important line of communication and rotated it 90°, writing literally, forming a north and south channel. On the east, the Vistula alternately enters Prussian and Polish territory. On the west is the frontier of Germany. Although denied access to the Baltic via the mouth of the Vistula, the Polish government is zealously fostering this valuable water route which has its watershed in the wide southern frontiers of Poland. The products of the fields and industries of Poland, seeking an outlet into the Baltic, come down this main line of communication to bring up with a "bang" against the tariff wall imposed by Danzig. The Free City has been hostile; quarreling between it and Poland grew to such an extent and resistance to trade became so serious that the Poles, feeling that appeal to the League of Nations was hopeless, decided to build their own seaport. Twelve miles to the west of the mouth of the Vistula there has sprung up the seaport of

Gdynia. Ten years ago this port on the Baltic was nothing but a small fishing village. Its growth has been phenominal—today it equals Danzig in the matter of cargo handling facilities with a capacity to handle 15,000,000 tons a year.

At one end of the harbor of Gdynia, a naval basin has been established. Here may be seen units of the Polish Navy:

240 officers, 2,064 men; 2 gunboats, 2 destroyers, 5 torpedo boats, 3 submarines, 4 mine sweepers, 1 surveying ship, 1 transport, 2 training ships, 5 river monitors, 6 river gunboats, 30 river motor boats, and 32 mercantile marine steamers, totaling 33,775 tons; about 120,000 tons river craft of which some 10,000 tons are steamers.

Into this new seaport, railways are beginning to enter directly from the heart of Poland and from Silesia. Here is trade rivalry—here is concrete evidence of how failure to recognize the importance of the mouth of the Vistula has created a danger spot to the fostering of peace in Europe. Danzig is fast failing economically. Will the Free City with its population of some 400,000 Germans appeal to Germany for relief? In the war it was a part of Germany. Its citizens fought valiantly in behalf of Germany. Gdynia is destined to replace this old port. The financial ruin of Danzig is another wound in the pride of the German nation. It is well to understand this situation and to realize the facts.

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TAKE, NOW, THE ORDINARY case of a naval military staff being asked to prepare a war plan against a certain state and to advise what means it will require. To any one who has considered such matters it is obvious the reply must be another question—What will the war be about?

Before they take any step further they must know many things. They must know whether they are expected to take something from the enemy, or to prevent his taking something either from us or from some other state. If from some other state, the measures to be taken will depend on its geographical situation and on its relative strength by land and sea. Even when the object is clear it will be necessary to know how much value the enemy attaches to it. Is it one for which he will be likely to fight to the death or one which he will abandon in the face of comparatively slight resistance? If the former, we cannot hope to succeed without entirely overthrowing his powers of resistance. If the latter, it will suffice, as it often has sufficed, to aim at something less costly and hazardous and better within our means. All these are questions which lie in the ministers charged with the foreign policy of the country, and before the staff can proceed with a war plan they must be answered by ministers.

In short, the staff must ask of them what is the policy which your diplomacy is pursuing, and where, and why do you expect it to break down and force you to take up arms? The staff has to carry on in fact when diplomacy has failed to achieve the object in view, and the method they will use will depend on the nature of that object. So we arrive crudely at our theory that war is a continuation of policy, a form of political intercourse in which we fight battles instead of writing notes.—CORBETT.

STRIKING FOR WINGS

By ENSIGN LESLIE E. RICHARDSON, *U.S. Navy*

NEARLY ALL of us, upon seeing a plane soaring and diving easily and gracefully, have thought of the pilot at the controls of that plane as a being invested with some supernatural or unusual ability entirely unknown and quite unattainable to those of us destined to remain safely on the ground and admire the skill and daring of another in the air.

True enough, the guiding genius of that plane is an exceptional man, for relatively few are physically and temperamentally adapted to go aloft and put such a frail craft through dizzy loops and spins with the nonchalance and surety of a navy flier, but even this flyer had a beginning. There was a time when he flew as a mere passenger; then he was subjected to a rigorous ten hours of dual instruction, after which came the fatal check and then—his first solo! Following are a few of the sensations and experiences one may expect to encounter as he travels the first lap on the long and exacting road to becoming a navy flier.

The Naval Air Station, San Diego, California, is the setting for the first attempts of the young officers of the battle fleet to fly. The routine of reporting is soon dispensed with and, almost before he is aware of it, the new student is putting on his cumbersome gossport, jacket, and goggles, and is climbing into one of the NY's for his first hop. (For the benefit of the uninitiated, a gossport is a stiff leather helmet with ear phones and a voice tube through which the instructor is able to tell the student just what a rotten flier he really is. It is a one-way affair, for the student catches everything and returns nothing.) The instructor then "gives her the gun" and, with a rush and a roar, the training has begun. In a few seconds the earth starts dropping away, and they have only sea gulls for company. Then follows an hour or so of straight flying with a few easy turns and spirals and then down to "think it over."

On the next hop, the student is allowed to place his hands and feet lightly on the controls and follow the instructor as he maneuvers the plane. One is amazed at the sensitiveness of a plane in flight and its immediate response to the slightest movement of the stick or rudder. It is practically impossible to see the top of the stick move when making a shallow turn.

After two such hops, intended only to permit the student "to see what it is all about," comes the dual instruction with its ups and downs, bumps, and whatnot. For the purposes of student instruction, the navy has a field some eight or ten miles down the strand from North Island. It is here that one's hopes of becoming a flier are soon brightened or dimmed. The usual procedure is to take off, fly to Ream Field, and then try to make a landing. Some time on the way down the instructor will shake the stick, pat the top of his head, and hold both hands in the air. Obviously enough, this means but one thing—take charge! After circling the field once to take a look at the "sock" and thus determine the direction of the wind, the student slips and slides into what is intended for a quarter spiral. Then on down he goes for an attempted landing wondering, meanwhile, just how strong that landing gear really is. The instructor is assisting most of the time during the first few hours of flying, but gradually relinquishes more and more con-

trol to the student, a fact attested to by the increasing roughness of the landings. As one young officer put it: "Well, I made several landings all by myself this morning." When asked how he knew, he replied, "If anyone had been helping me, they couldn't possibly have been as bad as they were."

Theoretically, one is supposed to come in on a smooth glide at about 60 knots, level off a short distance above the ground, and then gradually ease back on the stick thereby "keeping her off" until flying speed is lost, after which the plane should drop in on a three point landing. Usually the beginner levels off much too high above the ground or else flies the plane into the ground, thereby making a so-called "hot" landing, with the wheels touching before the tail skid. All beginners seem to have a tendency to make hot landings and no error calls for such sudden and strong comment from the instructor as does this one. Whatever happens—keep that tail down.

The student improves gradually, very slowly it seems, but improvement can be noted up until about the seventh hour, at which time practically everyone takes a slump. It seems strange, but it is true that at about this time it is apparently impossible for him accurately to judge his distance from the ground when leveling off and the result is a series of unusually rough and rocky landings. Improvement then sets in and he gradually works up to the point where he should be able to take off and land safely, not smoothly—simply safely—a point stressed throughout the entire training period. Be safe!

At the end of ten hours' dual instruction, he flies down to Ream Field for a check hop and, if successful, a solo. One's feelings just prior to the check hop are a mingling of prayers and hopes. A "down" check from the check pilot means that you may be a good man but you can't be a naval aviator; an "up" check means a chance for Pensacola and wings! For the check hop, the detested gossport is discarded and a soft helmet is worn. The check plane is another NY but is not the one the student has been used to. The check pilot climbs in, motions the student to take off and, after circling the field, make a spiral and land. Three good landings, successively made, usually convince him that the pupil is qualified to solo, providing the take-offs and air work are satisfactory and the regular instructor has previously given him an "up" check. After the third successful landing, the check pilot taxies up to one end of the field, stops all other planes to provide plenty of room for action, climbs out, and says the words that the young aviator has awaited so eagerly, "Take her off!"

Just what are the sensations one experiencies on his first solo? The popular opinion seems to be that one becomes quite worried, not a little nervous, and greatly excited. Nothing could be further from the facts of the case. In the first place, one is so busy flying and thinking about what to do next that he has no time in which to become worried and, in the second place, there is nothing to worry about. One has unlimited confidence in his ability to take off and land because it has been done so many times with the instructor that there seems to be very little chance for a slip. True, the front cockpit is decidedly vacant and the only way to get down is to do it alone; but one cannot help but feel highly elated at actually flying by himself. In addition, it is somewhat of a relief not to have to wonder just what the instructor is thinking of each and every move made. It is a great feeling to be able to skid or slip a bit in a turn or spiral and not be told about it—a thing bound to happen in dual instruction.

Each student, in his solo, is required to take off three times. The landings are not exactly required, but after all one must come down some time. After the third landing, he taxies up to meet the check pilot

feeling himself quite indispensable to the future growth and development of naval aviation. With the exception of the ride back to North Island, the student's flying at San Diego is completed and a day or so later he is detached from the air station and returns to his own ship, where he anxiously awaits the day when orders will come to "report to the commanding officer, Naval Air Station, Pensacola, Florida."

What does a young officer gain from such a brief introduction to this fascinating and fast-moving branch of our naval service? First, he learns to appreciate the air service as an indispensable arm of our navy. While no naval officer, aviators included, could possibly think of aircraft as ever rendering surface craft unnecessary or obsolete, the officer student readily realizes the inestimable value of an efficient air service in its relation to our men-of-war. Operating singly, both would be relatively ineffective compared to the tremendous offensive power of ships and planes working together.

Second, he has an opportunity to observe first-hand the real work of the air service with its intensive schedules of spotting, bombing, machine gun, torpedo firing, etc. The actual maneuvering of the plane becomes second nature and more or less instinctive. Perhaps that very fact is the reason why instructing is such a trying and tedious job. Without digressing, a tribute should be paid to all those whose duty it is to teach others to fly. Their lot is a hard and thankless one, but when one considers how very many students undergo instruction and the countless thousands of miles flown without even a single minor accident to mar the record, there is no doubt but that they know their job and do it well. Their responsibility is great but consider, if you please, that of the check pilot. He is the one who decides upon a student's ability to fly alone and few people would care to be in his place when he sends that student off on his first solo. His unerring judgment is attested to by the absolute lack of accidents of any kind incurred by students at San Diego when they take to the air alone.

The young officers under instruction are strikingly impressed with the wonderful *esprit de corps* of our naval air service. Every officer from the commanding officer to the newest ensign is there because he is intensely interested in what he is doing. The high morale and efficiency so easily discerned are but a natural result of this healthy condition.

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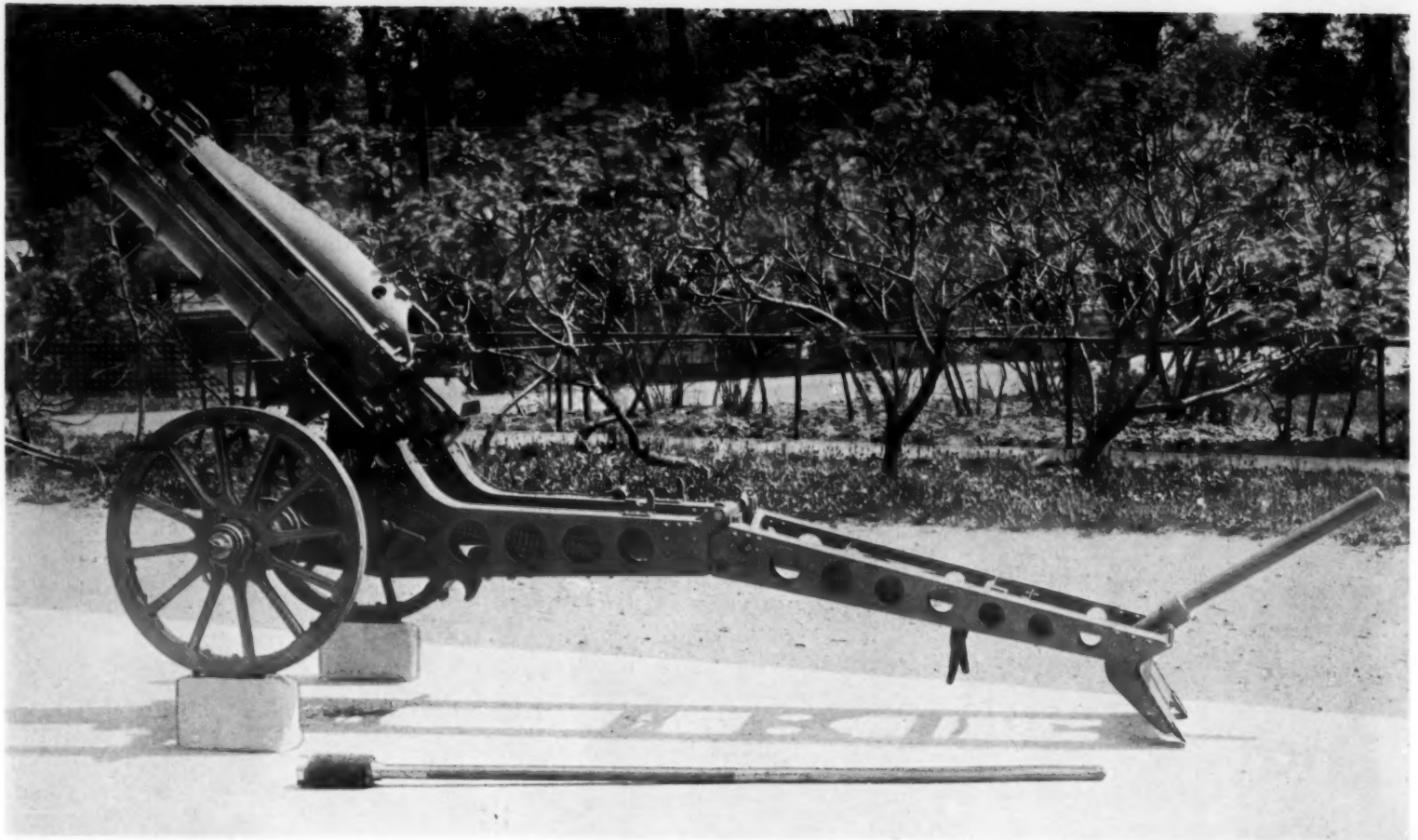
THE MORAL FORCES constitute the most powerful factors of success; they give life to all material efforts, and dominate a commander's decisions with regard to the troops' every act. Honor and patriotism inspire the utmost devotion; the spirit of sacrifice and the fixed determination to conquer ensure success; discipline and steadiness guarantee the necessary obedience and the coöperation of every effort.—NAPOLEON.

Courtesy Army Ordnance Association

BARREL OF A 16-INCH COAST DEFENSE RIFLE

(For comments on this group of photographs see Secretary's Notes

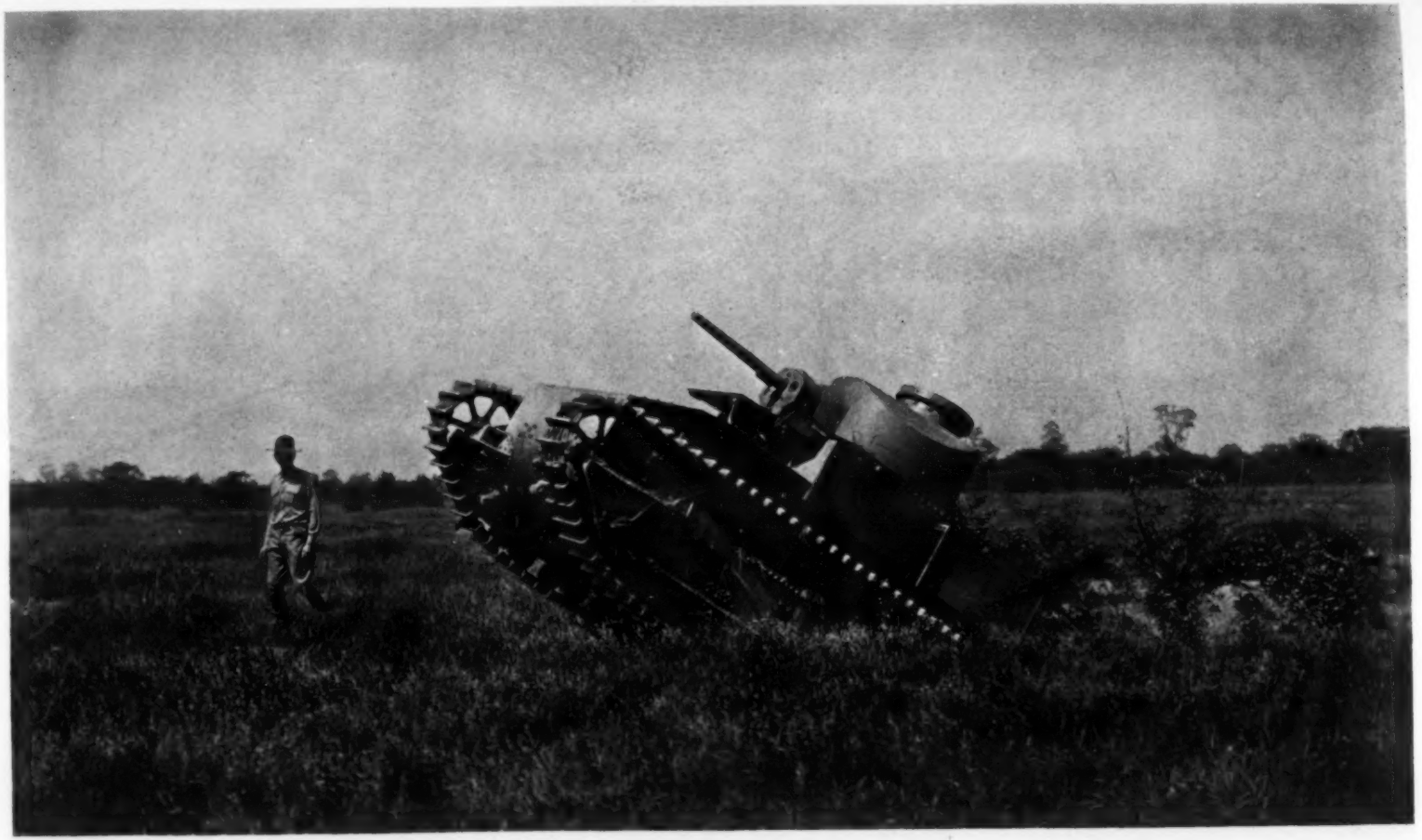


Courtesy Army Ordnance Association

ARMY 75-MILLIMETER HOWITZER

Courtesy Army Ordnance Association

ARMY 75-MILLIMETER HOWITZER



Courtesy Army Ordnance Association

ARMY MEDIUM TANK

Courtesy Army Ordnance Association

ARMY SIX-WHEELED ARMORED CAR

Courtesy Army Ordnance Association

ARMY SIX-WHEELED ARMORED CAR

Courtesy Army Ordnance Association

FOURTEEN-INCH RAILWAY GUN

Courtesy Army Ordnance Association

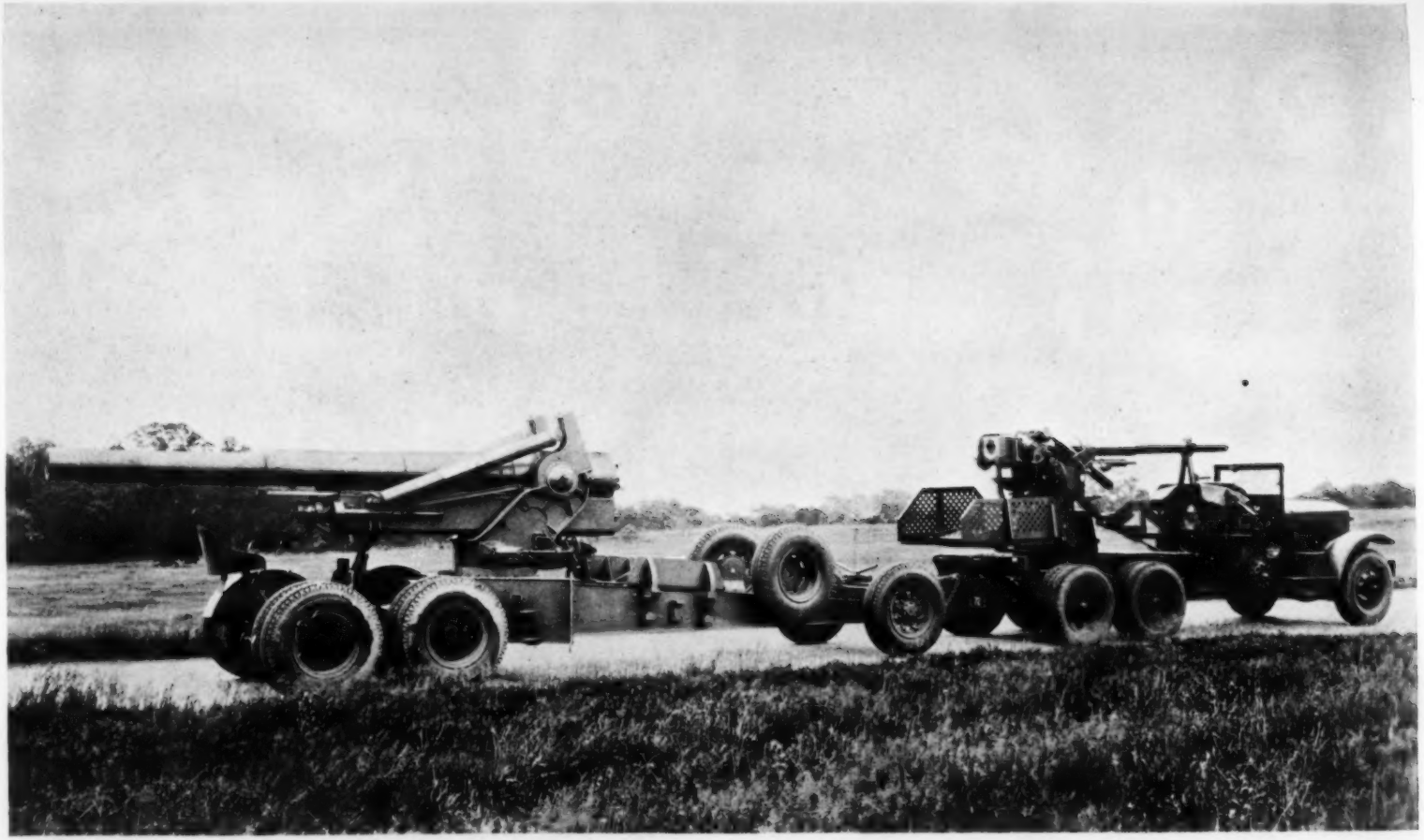
ARMY 8-INCH HOWITZER

A speed of fifty miles an hour can be attained by this mount on highways.

Courtesy Army Ordnance Association

ARMY 8-INCH HOWITZER

A speed of fifty miles an hour can be attained by this mount on highways.



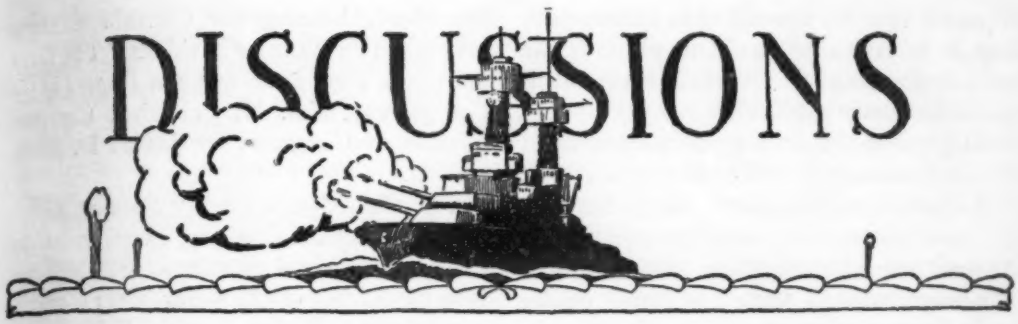
Courtesy Army Ordnance Association

ARMY 8-INCH HOWITZER CARRIAGE TOWED BY 3-INCH ANTI-AIRCRAFT GUN TRUCK

SIXTEEN-INCH GUN FIRING AT ABERDEEN PROVING GROUNDS

Courtesy Army Ordnance Association

DISCUSSIONS



SIXTEEN-INCH GUN FIRING AT ABERDEEN PROVING GROUNDS

Courtesy Army Ordnance Association

The First Element of Training for War

(See page 776, June, 1931, PROCEEDINGS)

LIEUTENANT PAUL S. SLAWSON, U. S. NAVY.—The organization of a permanent gunnery school has been urged for a long time, and it would seem that at the present its establishment in the very near future is of the first importance to the service. During the past three years in gunnery the author has noticed batteries, turrets, and even spot one given to officers who have had no previous experience in their assigned duties. In one case a broadside battery on one of our newly modernized battleships was being run by an officer who was a communication post-graduate, and a marine officer just up from Nicaragua. Neither had had any previous experience with this type of fire-control gear and both had had a very limited gunnery experience. Frequently entirely inexperienced officers have been given command of turrets. With such few battleships, and hence turrets, it seems vital not only to have them in charge of good men, but experienced men. The volume and accuracy of fire of our ships should not be continually lowered while officers are gaining the experience they should have obtained at a gunnery school. While it is realized that the suggested school will not guarantee all salvos to be well bunched and straddles, it should greatly increase the hits per gun per minute.

There are of course a small number of officers selected for the ordnance post-graduate course. However, this has little to do with actual shooting and fire-control procedure and doctrine. The instruction is chiefly in theory of construction, metallurgy, and up-keep of ordnance material. At any event, these few ordnance experts are not sufficient to man all the gunnery equipment afloat and ashore. Most of the shooting will be done by those of us who are just "plain sailors." In spite of our rather hit or miss assignments to gunnery duties we have developed some expert spotters, plotting-room, anti-aircraft, and turret officers who could organize a school and teach others their cunning. Such a school would also be able to do constructive and progressive research, and compile data of infinite value to the gunnery and battery officers afloat.

Due to our always present program of economy the chances of special buildings are probably out of the question. However, we have a good deal of equipment which could be used with little additional expense. We now have recently organized a training squadron which consists of the *Arkansas* and *Wyoming* and some destroyers. With these ships, furnished with modern ordnance equipment, and the facilities of the Naval Academy we would have a very good start. Later we could perhaps improve the whole layout. Probably only one or two ships would be needed at once and very little steaming would be required. Hence the present complement would be sufficient. In fact these ships being in reduced complements would give plenty of living space for both student offi-

cers and men. By operating in Chesapeake Bay or off the southern drill grounds the rafts and tugs of the Norfolk Navy Yard would be easily available.

At present the only modern equipment of the *Arkansas* and *Wyoming* consists of anti-aircraft range finders. Guns, fire control, and turrets have obsolete equipment. At least one of these ships, preferably the *Wyoming*, should have the latest equipment for anti-aircraft and broadside guns, and one turret should be brought as near up to date as possible. The equipment of the *Wyoming*, or *Arkansas*, and preferably the former, with modern ordnance material for the anti-aircraft and secondary batteries, main battery fire control, and one turret at least is highly desirable in view of the fact that these ships are used for training reserves, reserve midshipmen, and the midshipmen from Annapolis. The period of training for the first two groups is very limited and should be with the gear they will use in battle rather than with that now long out of date. It is also very desirable to train our regular midshipmen with the material they will be called upon to use when commissioned rather than on the museum pieces now available.

During the past three months turrets 3, 4, and 5 of the *Wyoming* have been turned into study-rooms. This space plus the available spare staterooms and bunk space, due to reduced complement, make her an excellent school ship. If her ordnance were modernized she would be ideal. No attempt is made to lay out a course of study as these details could be readily worked out. The object is to point out the urgent need of a special course of instruction in gunnery for the general line and the fact that we have at hand enough equipment and material with which to make a start.

The Hankow Incident

(See page 927, July, 1931, PROCEEDINGS)

MAJOR WILLIAM B. BRINCKLOE (Q.M.), U. S. ARMY.—Here is a very interesting precedent, bearing on Captain Colby's article, "The Hankow Incident." The facts are taken from *Messages and Papers of the Confederacy*, Vol. II, published (by permission of Congress) by James D. Richardson.

The Confederate cruiser *Sumter*, a converted merchant steamer, commanded by Captain Raphael Semmes, C.S.N., put into the harbor of Gibraltar, after a cruise, for refitting. Under date of February 2, 1862, J. M. Mason, Confederate commissioner in London, telegraphed to Captain Semmes: "Get ready for sea without delay or waiting further advice, as by recent government order you must leave this port on six days' notice." In the meantine, several United States cruisers had rushed to Gibraltar, and were lying in wait just outside the 3-mile limit. The British authorities, probably because of that fact, permitted the *Sumter* to remain. Captain Semmes, some months later, detailed Acting Midshipman Andrews, Petty Officer Hester, Sergeant of Marines Stevenson, and eight seamen, to remain on board as a guard. With the rest of his officers and crew he went to Liverpool, and thence to Praya in the Azores, where he boarded the *Alabama*, took her to sea, and on August 24, 1862, commissioned her as a Confederate warship.

The *Sumter*, fully armed and equipped, but with only a skeleton crew on board, continued to lie at Gibraltar, without protest from the British. On October 14, 1862, Petty Officer Hester deliberately shot and killed Midshipman Andrews. From a dispatch of Mr. Mason, at London, to Judah P. Benjamin, Confederate Secretary of State, at Richmond, it appeared that the shooting occurred on board the *Sumter*; and that "Hester had been taken into custody by the civil authorities." There is no explanation of the circumstances of his arrest. Mr. Mason adds,

> On the question of jurisdiction, it would certainly be right that he should be tried under the author-

ity of our government; but even should the jurisdiction be yielded by the British government (which, in our unorganized condition, is by no means certain) I should be at great loss to know how to bring the prisoner to trial, and what to do with him in the meantime. . . . I wrote to Lieutenant Chapman (in Paris) a former officer of the *Sumter*, and ordered him to proceed immediately to Gibraltar and take command of the ship.

The obvious course would have been to demand the return of Hester to the *Sumter;* but Mr. Mason hastily took steps to make such return impossible.

"I have further to state," he writes, "that in the dilemma arising out of this unfortunate affair . . . I have determined to have the *Sumter* sold, and have taken measures to have the sale made by Captain Bullock, the senior officer in the service here. Her armament . . . will be reserved."

The blockaded and undermanned *Sumter* was a liability, not an asset; and no doubt the Confederates had already considered selling her. Her skeleton crew could easily be transported through neutral countries, but a prisoner could not; hence, his presence on board would make her sale difficult, if not impossible. This, evidently, was the reason for Mr. Mason's action. Some weeks later he writes further:

I presented the question of demanding the prisoner for trial by the Confederate authorities, to Mr. Slidell, (Confederate commissioner at Paris) and was happy to find that he agreed with me as to the expediency, or indeed necessity, of leaving the matter in the hands of the British authorities. I have directed Lieutenant Chapman to make some provision for the expenses of counsel and witnesses, for Hester's defense. . . . I learned by telegraph this morning that the ship has been sold to a British house.

Mr. Benjamin, in a dispatch to Mr. Mason, asserts that since the offense was committed on board the *Sumter*, it was

as much within our exclusive jurisdiction as if committed on the soil of the Confederacy. . . . It is to be feared that this case, however, may be hereafter cited as a precedent against us when our circumstances shall be changed; and it is . . . unfortunate that our silent acquiescence, enforced as it has been by our . . . condition, leaves us open to misconstruction.

Later on, however, Mr. Benjamin writes to Mr. Mason, ". . . I have received your correspondence, and . . . the volunteer admission of the British government that the jurisdiction is with us, is so far satisfactory." But the British government followed up its "volunteer admission" by something very much more concrete. On May 2, 1863, Lord Russell writes to G. Moore, British consul at Richmond:

Arrangements are in progress for transferring to Bermuda, for present custody, the prisoner charged with having committed a murder on board the Confederate steamer *Sumter* at Gibraltar; and that, as soon as the consent of the government of the United States has been obtained for the passage through the blockade of Her Majesty's ship in which the prisoner will be embarked, he will be sent to a port in the possession of the Confederates, for delivery to the local authorities.

Here the story ends. Whether Hester ever was delivered to the Confederates, I do not know; but the action of the British government, up to that point, established a very strong precedent.

The circumstances would apparently have fully justified Lord Russell in letting British law take its course. His government had not recognized the Confederacy as a nation; no demand had been made for the surrender of Hester; the Confederacy had deliberately made it impossible for him to be handed over at Gibraltar. It might be said that Lord Russell felt that he must be consistent with his demands in the *Trent* affair; but a study of Mr. Hill's article on "Charles Wilkes," (in the July, 1931, PROCEEDINGS) will show that the two cases were not parallel, by any means. The *Trent* was forcibly stopped, on the high seas, and the Confederate commissioners, who were accused of a political, not a criminal offense, were forcibly removed by an armed naval boarding party, against the protest of the mail agent, who was a British naval officer. The *Sumter* was lying in British waters; Hester had committed murder within that jurisdiction; he was arrested by British civil

authorities without any protest whatever, then or thereafter, from the Confederates. Indeed it is not clear from the dispatches, that Hester was arrested on board the *Sumter;* more probably he fled to the shore, and was seized there. (Perhaps some reader of the PROCEEDINGS can clear up this point; the records of the British government of course contain all the facts. Very likely the report of Lieutenant Chapman is preserved, with other Confederate papers, in Washington; this report no doubt gives full particulars.) On the other hand, Hester was a regular member of the crew of a foreign warship; which ship was, by British sufferance and permission, lying in British waters.

The explanation of Lord Russell's action seems to be that the British deliberately took advantage of this case to establish a precedent in international law, which plainly might be of very great use to them, some day. And in the Hankow incident they were following this precedent. The sole difference was that one offense was committed on board ship; the other, ashore. But both were committed entirely within the territory of the foreign power; and in both cases the offender was arrested by the civil authorities.

International law consists very largely of unchallenged precedents. The *Sumter* precedent has gone unchallenged for many years. The failure of the Chinese authorities to challenge it, in the Hankow incident, would seem to establish its underlying principle very firmly indeed. This principle, as set forth by Captain Colby, is, "Interference with his (the soldier's or sailor's) liberty, by local tribunals of the foreign country where he is stationed with implied or explicit consent, is interference with the . . . sovereign state which he serves."

PROFESSIONAL NOTES

JULY 1 TO AUGUST 1

COMPILED BY MEMBERS OF THE EDITORIAL STAFF

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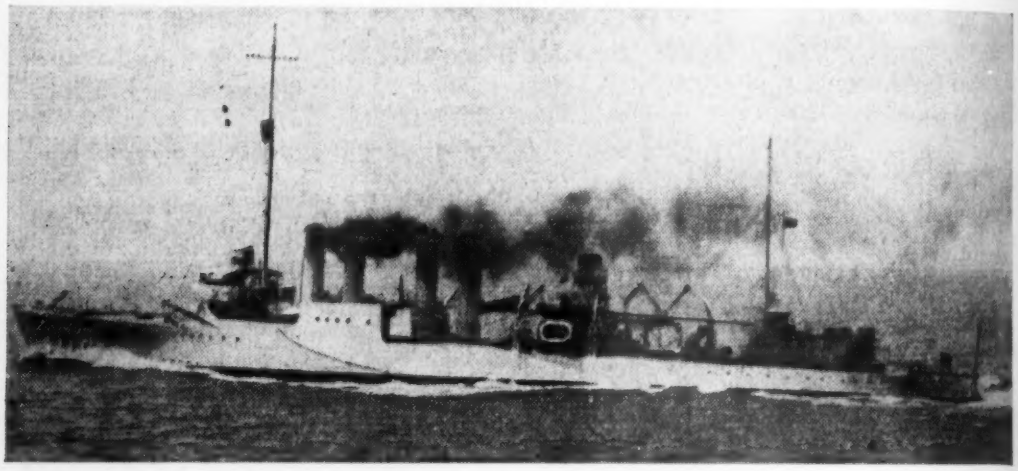
UNITED STATES

Radio-Controlled Destroyer Target

New York *Herald Tribune*, July 25.—An unmanned destroyer maneuvered at high speed off San Diego yesterday, and, among other things, made a 180° turn, described by naval officers as the most startling trick ever performed by a crewless ship.

The ship was the U. S. S. *Stoddert*, a 195-foot vessel of 1,500 tons. Everything from its whistle to its rudder was operated by radio from the bridge of the control ship, the destroyer *Perry* which followed in its wake.



Lieutenant Commander Boyd R. Alexander, commander of the *Stoddert*, and Lieutenant Commander Earl H. Quinlan, commander of the *Perry*, stood on the bridge of the *Perry* watching the *Stoddert*. Lieutenant Commander Alexander turned to a sailor standing before a little box bearing eight keys, resembling those of a typewriter.

"One hundred eighty degrees right," said Commander Alexander.

"One hundred eighty degrees right, sir," said the sailor, tapping the keys.

At the etheral command the *Stoddert* veered from the straight course it had maintained for miles and swung completely about without slackening speed.

Commander Alexander smiled. "That is the first time that ever has been done," he said. "There's a lot of machinery operating itself over there."

Every officer and man of the *Stoddert* was transferred to the *Perry* prior to the test. With a radio robot at her wheel, the *Stoddert* moved out to open sea at 6 knots. The *Perry* followed. The speed of the *Stoddert* was stepped up to 15, then 20 knots. She blew her whistle and blinked her great searchlight at radio commands. Then the order "full speed ahead" was given and she moved at 26 knots, or about thirty miles an hour. The radio robot was doing the work of sixty men.

For seventeen miles the *Perry* followed its crewless leader.

En route back to San Clemente Island, something snapped in the radio equipment. The *Stoddert* came to a stop automatically, turned off her steam and whistled lustily for help.

The *Stoddert* was ordered decommissioned recently and converted into a target for battle practice. Airplanes using dummy bombs will attack her.

Diesel Motors

New York *Herald Tribune*, July 15.—American naval experts have agreed ten-

tatively on plans calling for use of Diesel engines in at least one new warship.

Installation of these oil-burning motors would mark another step in a new naval policy designed to match foreign improvements and increase the effectiveness of the fleet, while keeping within the limitations of the disarmament treaties.

This general policy of increased effectiveness without increase in size is described by Navy tacticians as the substitution of "quality for quantity" in the race for naval supremacy. With the navies of the world limited in size by treaties, a premium has been placed on efficiency.

The Germans were the first to combine the new naval technique in one ship. Their newest cruiser is a light, fast, well-protected ship, driven by powerful Diesel engines, which make the vessel practically independent of naval bases.

Cruisers

Baltimore *Sun*, July 22.—The fact that the 8-inch-gun cruisers which big-navy enthusiasts for the last ten years have declared indispensable to American national defense are now proved defective on two important counts was discussed at a meeting of the general board today and also made the subject of comment by Secretary of the Navy Adams.

"The way to build a navy," he said, "is to be constantly building ships over a longer period of time, and not lump their construction all in one bunch."

Then, evidently having in mind the building program the Navy wants to finish before the expiration of the London Naval Treaty, he added that "life is short and it is necessary for us to have ships completed within a certain time."

Questioned regarding the fact that all of the crack new cruisers roll so much that non-rolling equipment will have to be put on them, Secretary Adams said this would mean relatively slight expense in comparison with the total for one cruiser.

He said the Navy's construction experts had not yet determined whether the cracked stern posts on five of the new cruisers was the fault of design or building. He suggested, however, that it probably was the fault of the designers in getting a casting too thin in order to save weight in another part of the ship.

That the new cruisers roll more than they should was explained by Secretary Adams as due to the fact that their centers of gravity were placed too low.

"All ship design is compromise," he pointed out. "If you put the center of gravity low you increase the safety of the vessel when it is damaged at sea. She will not roll over and sink so easily when hit, but she will roll more in a storm. If, on the other hand, you put the center of gravity higher, you prevent rolling at sea, but lose part of the ship's safety when damaged."

The ships which first will get the anti-rolling gear are the *Northampton* and *Pensacola*, now in the Norfolk and New York Navy Yards, respectively. One will be equipped with longer and wider bilge keels, which are steel fins extending from the side of the ship near the bottom.

The other vessel will be equipped with rolling tanks of water, placed on either side of the ship's hold and connected with a pipe. When the vessel rolls too much the water shifts through the pipe from one tank to the other, thus equalizing the ship's balance.

After these experiments have been worked out non-rolling equipment will be put in the other cruisers.

Destroyer Bids

Associated Press, July 13.—For the first time since the war, the Navy will advertise Wednesday for bids on a group of new destroyers.

Specifications virtually completed today for eleven new vessels, the first of this class the Navy has undertaken since 1918, call for a bigger, more rugged ship with heavier

armament and a higher sustained sea speed than the present destroyer.

The new craft will be of 1,500 tons displacement, the limit under the London treaty, compared with 1,200 tons for the present destroyers, designed in 1916.

Estimates will be invited from private companies and from all ship building navy yards except those at Philadelphia, Portsmouth, N. H., and Norfolk, Va., which already have heavy construction programs under way.

The yards which will be asked to make estimates on one destroyer each are at Boston, New York, Charleston, S. C., Mare Island, Cal., and Puget Sound, Wash.

Private shipbuilding companies will be allowed to bid on one or on two destroyers.

Construction of one of the eleven already has been awarded. To avoid an expected drop in the work load at the New York Navy Yard, it was announced two months ago that one of them would be built there without the necessity of submitting estimates.

The estimated cost of the new destroyers is $4,700,000 each, as compared with the $2,000,000 average cost of those constructed at the time of the World War.

The eleven destroyers were authorized in 1916, but funds were not appropriated until the last session of Congress, when $10,000,000 was provided for beginning work.

The construction of these eleven destroyers is the first sizable step taken by the United States since the signing of the London treaty to build up to its terms. As most of the present American destroyers were built during the war and sixteen years is the life of this type of craft, Navy officials pointed out that other replacements will be necessary shortly in the destroyer class to maintain treaty strength.

Turbines for Modernized Ships

New York *Herald Tribune*, July 18.—As an economy measure, the battleship *New Mexico*, the world's first electrically driven warship, is to have her costly 32,000-hp. electric propulsion plant replaced with four sets of turbine engines, the Navy Department announced today. The change will be made while the ship is being modernized at the Philadelphia Navy Yard.

Rear Admiral Samuel M. Robinson, chief of the Bureau of Engineering, was quick to announce that the decision was in no sense a reflection on the adaptability of electric propulsion machinery to battleships. Nor, he added, does it mean that the Navy is abandoning electrically driven engines. The *New Mexico*'s electric engines, he declared, had proved highly satisfactory. Admiral Robinson said:

> The decision to change to turbine units in the *New Mexico* was arrived at after modernization plans for the ship and her sister-ships, the *Idaho* and *Mississippi*, were initiated. In the first place, the ship originally was designed for turbine machinery, and her interior bulkhead and below-water deck arrangements were such that when the department decided to equip her with electric drive the ship's hull construction was so far advanced that it was deemed inadvisable to change the bulkhead and deck arrangements in order to take advantage of the increased protection of machinery made possible by electric drive installation. These interior hull arrangements were made, however, in the design of electrically propelled battleships which followed the *New Mexico*.
>
> In advertising to prospective bidders, the department divided the machinery into various classifications, and, when bids were opened, we found we could make a substantial saving, approximately $300,000, by installing turbines of the same design in all three ships.
>
> Equipping the *New Mexico*, *Mississippi*, and *Idaho* with turbine drive, for which their hulls originally were designed, will give the fleet a division of three ships of homogeneous engineering characteristics, without undue sacrifice of funds or efficiency.

The U. S. S. *West Virginia*, *Colorado*, *Maryland*, *California*, and *Tennessee*, battleships designed subsequent to the *New Mexico*, as well as the U. S. S. *Saratoga* and *Lexington*, aircraft carriers which were converted from battle cruisers following the Washington Naval Limitation Treaty, are equipped with electric drive.

GREAT BRITAIN

Midsummer Naval Promotions

Army, Navy and Air Force Gazette, July 9.—The half-yearly promotions to captain and commander, R.N., contained the same numbers of names as on recent previous occasions, and the fortunate officers were chosen from about the same positions on their late lists. The 10 new captains were taken from the top half of a zone including 166 commanders of between four years' and eight years' seniority, of whom 80 were in the upper half of the zone. Ahead of all these were about 77 commanders who had passed the zone without being selected. The senior of the new captains stood eighty-fourth on the list of commanders, and the junior, one hundred and forty-second. The new commanders came from a zone which was not long ago moved higher up the list of lieutenant commanders, and now covers officers of between three years' and seven years' seniority. Twenty out of the twenty-five were in the top half of this zone, and the five below the halfway line had from four and one-half years to four years ten months' seniority. Usually, the junior of the new commanders has been an ex-mate, but on this occasion the one ex-mate included in the list has three ex-cadet officers below him, and is rather high up. His seniority as lieutenant commander, four years eight months, is greater than that at which any previous ex-mate has been promoted; and he is, in fact, the third ex-mate with seniority of October 13, 1926, who has been selected, the first being in the promotions of December, 1929, when the seniority was only three years two months. This tendency to keep the selections for this class of officer so high up the list puts a barrier in the way of their rising beyond commander's rank, owing to the later ages at which the majority of them gained their commissions. An interesting feature of the new commanders' list is the inclusion of a cadet from the special entry made in 1913. This is Commander A. M. Sheffield, who joined the *Highflyer* in the first of the special entries in September, 1913, up to which date he was at Merchant Taylors' School. He now becomes a commander in company with cadets who had entered at Osborne in 1910–11.

Destroyer Construction

Naval and Military Record, July 15.—We have already referred to the apparent intention to speed up the building of cruisers between now and 1936, so that vessels shall be ready to run their trails within two years of being laid down. The rate of progress in destroyer construction promises to be equally satisfactory. Two vessels of the 1930 supplementary estimates were laid down in April last, and it is officially announced that these are expected to be finished towards the end of 1932. The remaining six destroyers and one leader, which will complete the flotilla, will shortly be taken in hand, and are due for completion early in 1933. This is as good as the average rate of building ships of this class in the years preceding the great war.

In his book *The Crisis of the Naval War* (p. 48) Lord Jellicoe complains that before the war the building of a destroyer usually took from eighteen to twenty months, whereas the Germans managed it within a year from the official date of the order. When he went to the Admiralty after the Battle of Jutland and had to meet the great U-boat campaign, Lord Jellicoe used every effort to expedite the building of destroyers, but with only moderate success. He urged that they should be completed within twelve months from laying down, but has to confess that they very rarely were.

The question is one of real importance. Relatively, our position in the matter of destroyer strength threatens to become more disadvantageous than it will be in cruisers, and that is bad enough in all conscience. Between the signing of the London treaty and 1936, eighty-eight flotilla leaders and destroyers will have fallen due for

scrapping under the age limit. The process of disposing of these is already going on briskly. During the same period only four flotilla leaders and thirty-two destroyers will have been completed, although it is true to add that another complete flotilla will be well on the way by the end of 1936. The destroyer is the most effective antidote to the submarine, and surely the lasting lesson of the U-boat campaign is the vital necessity of adequate defense against this form of attack, which would develop immediately on the outbreak of another great naval war. Our nearest neighbor is the premier submarine power of the world in the matter of numerical strength. It is imperative for us to remain the premier anti-submarine power in order to be able to protect our sea communications.

NAVAL NOTES

The following notes are taken from various sources:

Great Britain

The *Renown* is having a refit at Portsmouth instead of Devonport because there is no dock at the latter yard large enough to accommodate her.

"Starboard" and "port" will soon be supplanted by "right" and "left" in helm orders given under the English flag. This change was made in the American Navy many years ago.

The commanding officer of the submarine *Poseidon* recently sunk in China was convicted by a court-martial, and sentenced to dismissal from his command with a severe reprimand.

Each officer, on promotion, is required to furnish the Admiralty with his photograph.

The old battleship *Centurion*, radio controlled from the destroyer *Shikari*, furnished the target for Army gunners at Plymouth. The Air Force did the spotting.

After January 1, 1932, many rates will be closed to those who have not qualified in swimming.

The *Courageous*, aircraft carrier, was scheduled to complete her refit July 31. All other carriers except the small one, *Hermes* on the China station, will be, for one reason or another, in yards for some time.

The *Emperor of India*, target for experimental fire of the *Iron Duke*, was accidentally sunk. Since the water is shallow she is being refloated and will be scrapped.

France

The credits recently authorized provide for the construction of six 7,500-ton cruisers, one destroyer, one torpedo boat, one transport, and seven small craft.

President Doumer announced that the naval staff would report on the 24,000-ton cruiser when Parliament reopens in October so that orders might be placed in December.

The full-load displacement of destroyers under construction is nearly 3,000 tons. They will carry mines and probably eight guns instead of five. All told, the French have thirty large destroyers in service, under trials, or building. Twenty-four of these have 5.5-inch guns.

The naval cadets are being given more seagoing training than formerly.

Italy

The 10,000-ton cruiser *Pola* whose keel was laid in the spring is to have less speed and more protection than some of its predecessors.

The 2,000-ton destroyer leader *Pigafetta* is to be equipped with a Sperry gyrostabilizer. The rotor, 91″ in diameter, weighs 38,800 lbs. and makes 1,350 r.p.m.

Italian yards have built or are building four destroyers, two submarines, and three gunboats for the Turkish Navy.

The naval negotiations between Italy and France, an aftermath of the London Naval Conference, have not been dropped; but no agreement has yet been reached.

Japan

The government has ordered two 600-ton torpedo boats built at a navy yard.

These are not included under the London treaty.

The Army may be reduced by 20,000 men but the present seventeen divisions will remain.

The government in its effort to balance its budget ($50,000,000 deficit is in prospect) has listed the Navy for a cut of $6,500,000; but press reports indicate considerable opposition to this. It is claimed that the Navy made heavy sacrifices at the London conference and that further reductions would jeopardize the national defense.

The naval appropriation of 374,000,000 yen adopted by the last Diet, included 102,100,000 for the development of the air force.

Portugal

Two of the four 1,400-ton destroyers that Yarrow (an English firm) is building for this government will be constructed in Portugal. The machinery will, however, be built in England.

A number of other fighting craft, two submarines, some small cruisers, an aircraft carrier are being built at various yards in England and Italy. The guns will all be of British manufacture.

Miscellaneous

Seamen from eight navies participated in the Latvian Navy's celebration of its tenth anniversary.

The Argentine training ship *Presidente Sarmiento* is on her thirty-first training cruise with forty-six cadets aboard. She has cruised nearly a million miles.

The *Niobe*, a German training ship, carries sail, but has a 240-hp. auxiliary motor engine that can propel her at 7 knots.

The Canadian air force made over 103,000 photographs during 1930 in connection with Canadian survey.

Two British cruisers recently visited Kiel, the first friendly visit of English men-of-war to Germany since the World War.

The Fairey "Fireflies" built in England for the Belgian Air Force, dived at speeds around 384 miles per hour.

MERCHANT MARINE

Building Ships Today

The Grace Log, July–August.—The occasion of the keel laying for the first of the four vessels which will be placed in the Grace Line's Panama Mail service brought out one detail rarely specifically emphasized in descriptions of modern ship construction. When the keel was laid, an operation justifiably considered by the laity to mark the official commencement of work, approximately 40 per cent of the ship was actually already completed and ready for assembly. This forehanded procedure which would have composed more than a minor miracle not so many years ago, is characteristic of the business of building ships today. Sound production, skilled production, but above all, fast production, governs American shipyard administration and while it is not yet customary to turn out 16,000-ton units of the American Merchant Marine in sixty days as Donald McKay was wont to do when his 1,200- and 1,500-ton wooden clippers took the ways, it is completely customary to commence construction of a modern liner and in better than fourteen months make it ready for delivery to its owners.

Keel laying, however, no longer possesses the slightest significance as marking the birthday of a ship. It is the anonymous and unsung geniuses of the mold loft and plate and angle shop whose work it is for months previous to the keel's arrival upon the scene that has summoned the ship from the abstract into the concrete. Today, when one reads of the laying of a keel one may safely conclude that the ship, the essential rib of which this will be, has grown already out of childhood into maturity.

There is, literally, no more interesting

visual experience in the world than that to be had in a modern American shipyard when the crafts are at work in a big ship a-building. Assembly and construction move with a smooth, sure rapidity which is a doubt-proof testament to the ability of the United States to successfully rival the output of any martime nation in the world.

United States Exports

Engineering, June 26.—There seems to be no doubt that the productive capacity of American plant and men has definitely reached a higher level than can be satisfied by the home market, and manufacturers will be compelled to seek in exports the means of making up the deficiency. The extent of American capital invested abroad has greatly increased. Exclusive of the war debt, it is now about seven times as much as it was before the war, and experience shows how exports follow foreign investment. They have, for instance, diverted purchases of agricultural and mining materials in Colombia from Great Britain, formerly the chief supplier, and similar influences appear in other parts of South America. The establishment of some 2,000 branch or affiliated undertakings in export markets is now estimated to absorb direct investment amounting to nearly 1,500,000,000*l.* sterling. Banking facilities, if not more generous in respect to credit than are given by British banks, are provided on a colossal scale. The improvement in American shipping communications, notably to South America, has proved to be of great assistance to exporters. The prestige obtained in some South American and other countries through the employment of American economic advisers and financial commissions is said, moreover, to be having an appreciable, if indirect, effect in favor of American suppliers, and even the world-wide preponderance of American cinema films everywhere except in Germany, advertises the comforts and conveniences of American life, and helps, as the report says, to sell countless kinds of American products. Government support, finally, has never been lacking; the Bureau of Foreign and Domestic Commerce has now been re-manned and thoroughly organized, and is in intimate touch and coöperation with industrial and commercial associations all over the country and the leaders of every section of its industry.

The course of trade in the Dominion has resembled in some respects that in the United States, and, in particular, some of its industries have been over-developed, and its plant capacity generally is much greater than can be employed at times such as the present. Nevertheless, its imports last year were of the value of about 250,000,000*l.*, while the amount supplied from Great Britain was much less than a fourth of what was supplied from the United States, and less than a sixth of the total imports, in spite of tariff preferences in favor of the home country. There is accordingly a large volume of trade at present in the hands of foreign countries. The present moment is particularly propitious for an attempt to increase the British share. Such an attempt, as far as it relates to industries already carried on in Canada, must depend on supplementing and assisting Canadian industries rather than competing with them, and generally it should include the development of new lines and the investment of home capital. The report suggests a variety of measures and mechanism for studying the requirements of this trade and promoting it, and in particular, expresses the opinion that except for very large firms or those dealing in recognized specialities, home producers can no longer individually provide an adequate competitive selling service for this vast territory, but must operate coöperatively in groups.

Power, Speed, and Fuel Costs

Nautical Gazette, July 11.—The recent reports of some details of the new Cunard superliner confirm the length of 1,018 feet,

the beam of 115 feet and the horsepower of 200,000. But the report regarding speed now states that this new monster may be able to do as much as 35 knots.

With a horsepower of only 200,000, a sustained speed of 35 knots appears out of the question. The finely modeled airplane carriers *Lexington* and *Saratoga* with a length of 888 feet and a beam of 106 feet developed a maximum speed of 34.65 knots while developing their maximum horsepower of 212,317. Therefore, if the new Cunarder of much larger dimensions and a probable displacement of 70,000 tons has a propulsive power plant of only 200,000 hp. it does not seem reasonable that she will attain a speed of 35 knots or one-half knot faster than the airplane carriers which have very fine lines and a displacement less than 40,000 tons. But the report of 200,000 hp. for the new Cunarder does not necessarily mean that that figure will be her limit; and if a power considerably in excess of the reported 200,000 hp. is developed, a sustained speed of, say, 32 knots or more appears quite possible. In other words, it is reasonable to assume that the maximum speed of the Cunarder will exceed the maximum speed of the *Europa* by at least one or two knots, possibly more.

The *Bremen*, with a length of 938 feet and a beam of 98 feet, developed a speed of about 29 knots on more than 130,000 hp. It is reported from several sources that the full power of the *Bremen* is about 140,000 hp., while that of the *Europa* is about 160,000. In other words, these two fliers, which now hold the Blue Riband, evidently have some spare power and speed up their sleeves—over and above what they have so far demonstrated. But it is doubtful whether they could maintain a speed of over 30 knots on an Atlantic run.

World Shipbuilding

New York *Herald Tribune*, July 15.—With the exception of Spain, the United States was the only shipbuilding nation in the world to show a gain in construction in the quarter ended June 30, according to *Lloyd's Register of Shipping*, which announced yesterday that this country was building 301,489 gross tons of merchant vessels or about 70,000 tons more than in the previous quarter. The United States also moved from third to second place among the shipbuilding nations, replacing France, which declined 20,000 tons. The United States shipbuilding output is higher today than at any time since the end of the war building boom, and more than double the total for American shipyards in the period just before the war. The gains of this country in the last quarter also have put the United States only about 250,000 gross tons behind Great Britain and Ireland, whereas those countries led by more than 460,000 tons in the previous quarter, and by more than 1,150,000 tons a year ago.

The total now under construction throughout the world amounts to 1,825,987 gross tons, as compared with 1,999,866 for the quarter ended March 31 last. As compared to a year ago world shipbuilding has declined 1,232,000 tons. Once again the bulk of the decline is accounted for by the shipyards of Great Britain and Ireland, which show a decrease from the March quarter of 138,000 tons. Little more than 500,000 tons of merchant ships are now building in Great Britain and Ireland, a figure below which these countries have not fallen since 1892.

Of the current shipbuilding throughout the world 1,130,504 gross tons are being constructed under the supervision of Lloyd's register and intended for classification with that society.

The decrease in world shipbuilding is also strikingly shown by the returns giving the new work begun and the tonnage launched during the quarter ended June 30. In that period the ships sent down the ways represented 235,000 gross tons more

than the new ships begun. In Great Britain and Ireland launchings exceeded new work by 147,000 tons, while for all other countries together the excess of launchings was only 88,000 tons. While new work in Great Britain and Ireland aggregated only 22,000 tons, the figure for the United States was 88,950.

General declines were shown during the last quarter in the construction of steam and motor tankers of 1,000 gross tons and more. For all countries combined there was a decrease of about 135,000 from the total for the quarter ended March 31, or 627,810, as compared with 761,603 tons.

There also was a falling off in the number of motor-driven vessels under construction during the last quarter as compared to other types of vessels, the tonnage for motor ships being 870,698, as compared to 955,289 for other types. During the March quarter there were 1,047,146 tons of motor ships under construction, as compared with 952,720 for vessels of all other types.

Several changes were made in the relative production ranking of the various shipbuilding countries during the quarter just ended. Great Britain and Ireland still hold first position, but by a greatly diminished margin.

	June 30	Mar. 31
Great Britain and Ireland	555,603	693,814
United States	301,489	231,003
France	211,940	232,115
Italy	170,658	174,452
Germany	130,651	135,951
Sweden	110,355	141,305
Holland	108,299	120,630
Denmark	90,655	114,711
Spain	60,700	47,874
Japan	46,269	57,200

Italy showed a loss of about 4,000 tons, but retained fourth place; and Germany, despite a decline of about 5,000 tons, advanced from sixth to fifth, ousting Sweden, which, with a loss of 30,000 tons, fell back from fifth to sixth. Holland showed a decrease of 12,000 tons, but held in seventh place, and Denmark, although losing 24,000 tons, remained eighth. Spain, with a gain of 12,000 tons, took ninth position from Japan, which lost 10,000 tons.

The comparison of the various countries in tonnage under way in the last two quarters is shown in the table.

Of large ships, each of 20,000 gross tons or over, there are now being built, eighteen, as compared with fourteen at the end of March. United States shipbuilders lead, with seven of these vessels under way. Five are being built in Great Britain and Ireland, and France and Italy are each constructing three.

ENGINEERING

The Hamburg Cavitation Tank

Marine Engineer and Motorship Builder, July.—It is well known that the model results for high-speed propellers are not applicable to the full-size propeller due to the occurrence of cavitation in the latter. This breakdown in the model law is due to the absence of pressure similarity between model and full scale which is a direct consequence of the atmosphere being the same for both. To remove this serious discrepancy it follows that the model must be tested under a reduced atmosphere. This obviously necessitates an enclosed tank which, again, of necessity, must be of relatively small dimensions.

The type recently constructed at Hamburg is of the enclosed vertical ring type, 5 m. between upper and lower centers and 6 m. between the two vertical centers. The water is circulated round the tank by a propeller driven by a 100-hp. motor. On the delivery side of the propeller the section of the ring is rectangular, increasing from 1,030 mm. by 1,140 mm. to 1,140 mm. by 1,540 mm. before converging to a square section having rounded corners with a diameter across the corners of 500 mm. This section forms the observation chamber. On the return side, the cross section is circular. Particular attention is given to ensuring uniform flow velocity by

suitable honeycomb, baffle, and director plates. Actual calibrations of velocity across the observation section show the velocity fluctuation to be extremely small.

In addition to the whole tank being arranged to work under any vacuum, the water can be heated to boiling point and kept by jacketing at a steady temperature. The purpose of using hot water is, of course, to increase the vapor pressure and thus obtain cavitation at higher pressures.

The actual construction work of the tank was undertaken by the old Vulkan Yard, all plating being electrically welded. Very careful preliminary tests have already been made by way of calibration of the apparatus and satisfactory results obtained. The first actual investigations will deal with the determination of the lift and drag of usual propeller sections in various stages of cavitation in order to place the blade element theory of propeller design upon a firmer basis. Simultaneous with this work, tests will be made on propellers fully submerged and also partially submerged to obtain greater information concerning the performance of propellers in the ballast condition.—*H. Lerbs. Werft Reederei Hafen*, June 1, 1931.

Test New Type Condenser Scoop

Marine Journal, July 15.—A new type of condenser scoop for high-speed vessels, designed by H. F. Schmidt, of the Westinghouse organization, has recently been developed, and a one-half scale model has been given a very exhaustive trial. The scoop was installed aboard one of the Navy's laid-up destroyers at New London, Connecticut, and the tests were made off that point.

By way of very accurately determining the characteristics of the device, it was connected to a Venturi meter rather than to an actual condenser. In this way, it was possible to make test runs at all speeds and accurately plot the charactertistics of the scoop.

The scoop itself is unique, in that no portion of it projects beyond the skin of the ship. For this reason, it is sometimes termed the "scoopless scoop," but it is largely by reason of this feature that it is expected to revolutionize the design of condenser scoops. Previously it has been thought necessary to have some projection beyond the skin of the ship so as to literally "scoop" the water into the inlet water nozzle. A moment's reflection is sufficient to demonstrate that if the scoop be located below the water line, no difficulty will be encountered in keeping it filled with water—particularly if the angle between the center line of the throat at this point and the skin of the ship be kept reasonably small. Combining this feature with a properly designed divergent throat, to convert the velocity head thus attained into useful pressure, and adding guide vanes to reduce turbulency of the flow has resulted in giving an entirely new and decidedly improved concept of condenser scoop design, the importance of which is indisputable.

From the standpoint of ease of installation the new scoop is a decided improvement over the old design. It is so designed that it is only necessary to pierce one of the ship's frames in order to effect its installation whereas, with the former design, at least two, and sometimes three, frames had to be so pierced. The above mentioned trials were attended by many prominent individuals including representatives from the U. S. Navy, Bureau of Construction and Repair, and the U. S. Coast Guard. All were greatly impressed with the results and the opinion was generally expressed that a definite forward step had been made in the design and performance of this all-important auxiliary in the operation of high-speed vessels.

Economy of a Diesel Electric

Marine Engineer and Motorship Builder, July.—No ship to be completed in the

past few months has created greater technical interest than the *Lochfyne*, the first Diesel-electric vessel for service in home waters.

It has been determined that the specific fuel consumption of the main Diesel engines worked out at about 0.40 lb. of oil per s. hp. per hour, which is very satisfactory for engines of 1,000 i. hp. running at a speed of 330 r.p.m. With regard to the over-all performance, i.e., taking into account the transmission losses in the electrical propulsion equipment, it has been determined that the daily fuel cost of the *Lochfyne* works out at about £3 10s. to £3 15s. per day. This figure has been checked by representatives of the owners, who mentioned that the fuel cost was thus only about 50 per cent of that of the company's coal-burning steamship *Fusilier* with machinery of considerably less horsepower. It must be remembered, of course, that the *Fusilier* was built in 1888, but even so, considering the relative cost of the solid and the liquid fuel, the figures constitute an excellent tribute to the efficiency of the Diesel-electric drive.

Engineering Plant of H.M.S. "Acheron"

The Engineer, June 26.—H.M.S. *Acheron* is one of the *Acasta* class of destroyers, and has a designed speed of about 35 knots at an output of about 34,000 s. hp.; her displacement is 1,330 tons, with a lengths of 312 ft. between perpendiculars. Her armament comprises four 4.7-inch guns, two 2-pounder pom-poms, five machine guns, and eight 21-inch torpedo tubes on quadruple mounts.

The distinguishing feature of this vessel is to be found in the main engine- and boiler-rooms. The boiler pressure is 500 lbs. per square inch, with a total steam temperature of 750 deg. F., as compared with a boiler pressure of 300 lbs. per square inch and a total steam temperature of 600° F. in the other vessels of the *Acasta* class.

The propelling machinery is arranged on two shafts, the driving unit of each consisting of four high-speed turbines coupled to the shaft through reduction gearing. The proportion of power developed by the respective turbines is approximately as follows:—H.P., 18 per cent.; first I.P., 23 per cent.; second I.P., 26 per cent.; L.P., 33 per cent. End-tightened blading is fitted throughout the reaction stages of the H.P. ahead turbine and throughout the first I.P. ahead turbine in order to obtain the highest efficiency under all conditions of steaming.

Monel metal is used for the reaction blades of the H.P. turbine and of the first expansion of the first I.P. turbine, and manganese copper for the remaining expansions of the first I.P. The remainder of the ahead reaction blades are of 70/30 brass; in the astern turbine the blades are of stainless iron. The ahead and astern impulse blades are of stainless steel and the nozzle vanes are of A.T.V. steel cast into phosphor-bronze matrices.

The high-pressure cylinders have heavy flanges with high-tensile steel bolts and studs and wrought iron nuts. The flanges are relieved by saw cuts at each bolt hole.

Expansion of the turbines is adequately provided for, and the main steam lines are arranged with corrugated bends to give the required elasticity.

Special attention was given, in the design stage, to the ventilation of the engine-room in view of the high steam temperature, and the insulation of the heat radiating surfaces also was very thoroughly considered. As a result the engine-room under all conditions of running is very cool and the comfortable condition of both boiler- and engine-room spaces was most noticeable on the trial.

The surfaces of the high-pressure turbine casings are lagged with special magnesia about 1 in. thick, applied in a plastic condition and covered with sectional magnesia blocks fitted in contact. An air space is left between the inner insulation and the

.5-inch thick asbestos millboard secured to the cleading plates. The high-temperature steam pipes and fittings are lagged with special magnesia sectional blocks between covers of asbestos cloth. The joint flanges are fitted with magnesia mattresses specially arranged for easy removal and examination of the pipe joints when desired.

All the auxiliary machinery is arranged to work with steam at a reduced pressure of 300 lbs. per square inch and to exhaust against a back pressure of 35 lbs. per square inch. This arrangement involved very little departure from the established practice of the makers of this class of machinery. The reduction in the steam pressure is obtained partly by use of reducing valves and partly by restriction in the sizes of the auxiliary steam pipes and connections.

Steam enters the H.P. ahead turbines through nozzles which are specially grouped for use under low power and cruising conditions. Under full-power conditions H.P. steam is admitted direct to the reaction portion of the H.P. turbine, but a flow of steam is maintained through the impulse nozzles of the cruising element under all powers.

Labyrinth packing is fitted in the glands arranged at each end of each turbine, with suitable pockets and connections for the control of the supply and leak-off steam as required for sealing purposes.

The screwed column type of lifting gear is supplied for all turbines and permits ready examination of the rotors, blading, etc. Suitable doors are arranged on the gear cases for examination of the pinion and gear wheel teeth. The gearing is of the double helical type, the wheel being built up of steel plates, with loose rims bolted on, in accordance with usual naval practice. The main thrust block is of the single-collar self-adjusting pivoted type.

The condensers are connected directly to and underneath the L.P. casing and arranged with rolling chocks to obviate distortion of the cylinder casing when the vessel is rolling heavily. Rolled steel plate and angle construction is used for the condensers, which are of the single-flow type. The circulating water inlets and discharges are arranged to give a scoop effect, which is assisted, as required, by turbo-driven geared circulating pumps. This arrangement was found to work very satisfactorily throughout all the trials.

The port and starboard propelling units are entirely separate and may be independently operated as desired. The maneuvering valves are arranged at the forward end of the L.P. turbine and the necessary pressure gauge boards, telegraphs, and other instruments are conveniently placed in clear view of the engineer on watch.

Forced lubrication pumps—one turbo-driven, working, and one motor-driven, stand-by—are fitted adjacent to the two oil drain tanks, which are arranged at the aft end of the engine-room in order to obtain the maximum fall from the turbines and gearing. All turbine and gearing bearings, the main thrust blocks, and the gearing are lubricated on the forced pressure system. Sight flow indicators are fitted in the drain pipes from each bearing. Oil coolers are fitted to maintain a constant temperature of oil in the system, and strainers in the discharge pipes to catch any foreign material before it can enter the system. An oil separator is fitted to cleanse the oil of dirt or water.

Water extraction pumps and two-stage air ejectors draw the water and air from the condensers. A well is arranged in the base of each condenser to provide a reserve supply for the water extraction pump when no steam or make-up water is entering the condenser. The level of water in this well is regulated by float-controlled overflow and make-up feed valves having connections to or from the main feed tank. A hand-regulated make-up feed connection is also provided from the reserve fresh-water tank. The boiler feed connections

are arranged on the closed feed system. The water extraction pumps deliver through the air ejector coolers to the main feed pumps, thence through feed heaters to the feed water regulators on the boiler steam drums.

An emergency turbo-driven feed pump for each boiler is arranged to draw from the reserve feed tank, and the pumps are kept primed and ready for instant operation by a small motor-driven air extraction pump fitted in each boiler-room.

For harbor use the exhaust steam from the auxiliaries in use is led to a combined drain cooler and auxiliary condenser which is circulated by sea water. The drainage therefrom passes through a filter and thence to the main feed tank. A de-aërator system is provided and comprises a de-aërator, a motor-driven combined extraction and lift pump and a separate turbo-driven harbor service feed pump. Water drawn from the main or reserve fresh-water tank is freed from its air content in the de-aerator and discharged by the extraction pump direct to the harbor service feed pump.

Two turbo-driven generators are fitted in the engine-room, each having an output of 80 kw. at 230 volts. A 20 kw. oil-driven generator is fitted at the forward end of the vessel for harbor and general use as required.

A 50-ton capacity evaporating and distilling plant is fitted in the engine-room, having connections for using both main boiler steam and exhaust steam from the auxiliary range. The pumps are motor-driven and are of the rotary type.

An electro-hydraulic steering unit is fitted in a compartment directly above the rudder.

The boiler-rooms, two in number, are arranged on the closed stokehold system, air being supplied by six forced draught fans, which are turbo-driven geared units. The forward room has one boiler and the aft room two boilers, as usually arranged. The boilers are of the three-drum small tube type, designed by John I. Thornycroft and Co., Ltd., in collaboration with the Admiralty.

The barrels are of forged steel with ends closed in, and are machined internally and externally. The generating tubes are of solid drawn steel, the two fire rows being $1\frac{3}{4}$ inches, the next four before the superheaters $1\frac{1}{2}$ inches, and the remainder $1\frac{1}{4}$ inches external diameter.

To each boiler superheaters are fitted, of the two-flow hair-pin type, with solid forged cylindrical headers. The ends of the headers are solid with the barrels, and to avoid fitting riveted pads, the barrels are thickened in way of mountings. The tubes are $1\frac{1}{8}$ inches external diameter, and of low carbon steel. They lie horizontally in the nest of generating tubes, the headers being parallel to the front of the boiler.

The boilers were designed for a superheat of 730° to 750°F. at full power, and when burning oil at the rate of .785 lb. per square foot of heating surface a superheat of 725°F. was obtained.

Owing to the restrictions on weight and space it was not feasible to fit large air heaters, and the surface is only 1,650 square feet to each boiler. To obtain the best results possible from these heaters, experiments were carried out by the Admiralty on a boiler at the Haslar Experimental Station, with the result that tubular heaters were adopted. The rise in temperature over the heater tubes was 135°F. at the aforementioned rate of burning. After leaving the air heater proper the air is led down the back of the boiler, and then divides, a portion going under the furnace and the remainder along the side casings to the boiler front.

The burners and combustion tubes are of the latest Admiralty design, and, in addition to giving a correct mixture of air and oil, the combustion tubes were specially designed to offset as far as pos-

sible the increase in stokehold air pressure necessitated by air heaters. As the air pressure in the stokehold at full power is only 3½ inches, it will be seen that this object has been satisfactorily attained. The oil fuel pumps, three in number, are of the direct-acting type, with six filters, three for the cold oil and three for the hot oil. Two oil heaters of the U-tube type are fitted in each boiler-room. The aft heaters have double the surface of the forward heaters. A three-throw hand oil fuel pump is also fitted in each boiler-room for lighting up purposes.

Safety valves of the full-bore type are fitted for superheated and saturated steam, these valves being set at 505 lbs. and 515 lbs. per square inch respectively. The feed regulators are of the contraflo type. Air is supplied to the stokehold by single-breasted turbo-fans, diffusers being fitted at the outlet of each fan.

During a recent exhaustive series of trials on the Clyde, the *Acheron* set up a new record in fuel economy for steam-propelled naval vessels, the oil fuel consumption on the full power trial being 0.608 lb. of oil per shaft horsepower for all purposes when the boilers were burning 0.785 lb. of oil per square foot of total heating surface, the water consumption being 7.77 lbs. per shaft horsepower. A high fuel economy was also obtained at reduced powers, namely, at 60 per cent of full power the oil fuel consumption was 0.675 lb. per shaft horsepower, and the water consumption 7.93 lbs. per shaft horsepower; at 10 per cent of full power the oil fuel consumption was 0.92 lb. per shaft horsepower and the water consumption 12.87 lbs. per shaft horsepower, the above figures of oil and water consumption being for all purposes.

AVIATION

Aircraft Armament

Army, Navy and Air Force Gazette, June 25. By Flight Lieutenant Tile G. Pynches, R.A.F.—Aircraft torpedoes of naval pattern are slightly modified to suit aircraft installations and to withstand the very high stresses set up by the force of impact on water when dropped from high speed aircraft.

Compared with naval standards, the aircraft torpedo has a higher ratio of explosive to weight, and, although the range is shorter, the speed is greater.

The latest pattern Whitehead aircraft torpedo weighs 1,600 lbs., and contains an explosive charge of 400 lbs. This torpedo has a speed of 42 knots at 2,000 yards range.

One of the early difficulties of torpedo dropping was due to the deep "dive" caused by excessive roll and acute angle in which the torpedo entered water. This has largely been overcome and it is now possible to drop torpedoes in comparatively shallow water from high speed aircraft at heights of 20 to 100 feet.

Aircraft torpedo attack against ships can be most effective, particularly when carried out under the protection of smoke screens.

The following excerpts from the *Times* on recent fleet and air exercises indicates the possibilities of this form of attack:—

> . . . The fleet assembled at five o'clock this evening twelve miles south of the Needles, and had moved up to within about five miles of the coast, when hostilities began at five-thirty. From that time the great ships, such as the *Nelson* and the *Rodney*, were within easy range of their target, and for the next two and one-half hours they and their powerful companies were given no peace. Air attacks on some part of the fleet developed every ten minutes. Almost before they came into action the aëroplanes were diving down on the vessels. Promptly at five-thirty nine "Flycatchers" came diving down through two layers of clouds from a height of 6,000 ft., to make gas and machine-gun raids on the cruisers *Centaur* and *Norfolk* and the *Adventure*, which are specially equipped for anti-aircraft work, and on the flotilla of destroyers, in order to keep them engaged while greater things were preparing. At the same time another formation of six "Flycatchers"

sought to put the anti-aircraft guns of the *Nelson* and the *Rodney* out of action.

Before these short, sharp strokes were over the biggest attack of the night was made. This was a mass torpedo assault by eighteen "Darts," ancient machines and obsolete, yet still fit for this kind of destruction when the way has been prepared for them. They approached the great battleships from both sides, came down almost to the water level, and discharged their torpedoes, generally at about 1,000 yards range. Torpedoes afterwards recovered showed that about 40 per cent of hits had been obtained, and it may therefore, be concluded that both capital ships were badly damaged before they had been firing more than five minutes.

A miscalculation by the admiral commanding the fleet had helped this attack. All day the sky south of the Isle of Wight had been full of low clouds, which were hanging, too, like a grey mantilla over the heads of the hills. The admiral had concluded that the aircraft could not come at him across the hills, but that they would take a clearer way round the Needles and come upon him from the west. On the assumption he had stationed two cruisers near the Needles for the purpose of interception, but he had been wrong. The aëroplanes, crossing from the western part of the island, had come in between the cruisers and the main body of the fleet they were intended to protect. Against this has to be set the fact that later this evening visibility improved greatly, and the air attacks were consequently handicapped.

This first attack, coming unexpectedly from the shore, found the fleet in division steaming eastwards. As soon as the assaults developed, the ships changed direction and formation, turning northwards to get into closer firing range, and changing from division into line ahead, a formation which they maintained for the rest of the fight. The original mistake was soon corrected, and the cruisers best equipped with anti-aircraft guns were stationed on three sides of the fleet by six-thirty. Thereafter a quick succession of air attacks was made, in many cases over the guns of these vessels, and there may well have been air casualties. Some of the aircraft, however, could not have been touched from the sea. In one case six Fairey III F's, bombing the *Marlborough* and the *Emperor of India* with 500-pound bombs, came fortunately out of the clouds right over the targets, dropped their missiles with good effect apparently and were safely away in a few minutes.

For certain operations such as the attack of bombing formations, airships and submarines, a gun of approximately 1.5 in. (37 mm.) caliber mounted in an aëroplane may be regarded as the most efficient form of aircraft gun. This type of gun could be mounted on a turret mounting in the forward cockpit of a twin-engined aircraft. For attacks on aircraft high explosive shell fitted with sensitive type of fabric-contact fuze should be used. Such shell must necessarily be self-destroying after a suitable interval, to avoid the shell exploding on impact with the ground.

A 37 mm. caliber gun would also be an effective antisubmarine weapon as it would enable the aircraft to carry out a surprise attack from any position and at comparatively long ranges, whereas in bomb dropping the aircraft must reach a definite bombing angle, thereby lending itself more vulnerably to enemy gunfire. In the event of a submarine being only partially disabled by gunfire, but unable to dive to safety, it could be dealt with by bombs. This method of attack would be of enormous value to convoys protecting shipping against enemy submarines.

The unique qualities of the aëroplane as a platform for such a comparatively heavy gun as one of, say, 37 mm., are not generally appreciated. The principal difficulty to overcome is the blast effect at the muzzle of the gun, which is, of course, very severe on the light structure of aircraft. Much of the "kick" or force of recoil of the gun is taken up in the elasticity of the aircraft structure, and as the aëroplane is air borne it possesses certain inherent cushioning properties, so that up to a certain limit the aircraft does not lose stability when a gun is fired from it. It is clear that continued development in the construction of larger aircraft will automatically increase the possibilities of mounting guns of greater power and higher muzzle velocity.

The modern tendency is to mount pilot's machine guns on the wings or on the fuselage outside the periphery of the air-screw blades, and operate them by re-

mote control. This has a four-fold advantage:—

(a) It enables a larger number of guns to be mounted, thereby increasing the volume of fire

(b) It dispenses with the necessity of synchronizing gear

(c) It leaves more room in the pilot's cockpit, which in modern aircraft is becoming more and more congested by instruments and various types of gear

(d) It enables four-bladed air screws to be used. This is, of course, particularly desirable where the tendency is to gear down the air screw which makes the two-bladed air screw too large and unwieldy for practical utility.

With regard to (b) probably 60 per cent of gun stoppages can be traced to faults in the synchronizing gear. Synchronizing gear also interrupts the fire and reduces the rate by approximately 15 per cent.

Another objection, particularly to the oil operated synchronizing gear, is the lag between the pressing of the firing lever and the actual deflection of the firing sear on the gun.

These are only a few of the many objections to synchronizing gear, and it will be appreciated that to eliminate such a source of trouble is a step in the right direction.

Diesel Aircraft-Engine Record

Aviation, July.—The Diesel engine took its first step towards acceptance as a power plant for heavier-than-air craft when, in the summer of 1928, a Diesel-powered machine first flew. The second step was made at the 1930 Detroit show, when the engine went on commercial sale. The third was accomplished last month, when a plane with a compression-ignition engine using furnace oil as a fuel circled over the beaches around Jacksonville for eighty-four hours and inscribed its performance upon the books as a world's record—the longest flight ever made without intermediate refueling.

With the passing of the refueling-duration excitement, and with the apparent decision to allow that record to stand permanently at its present level, trials for straight time in the air without replenishment of supplies begin to regain a proper degree of appreciation. No other record, unless it be some of those for speed with substantial dead loads, is of such importance as the non-stop distance and duration marks. No other has such bearing upon precisely those qualities of aërodynamic efficiency, fuel economy, and reliability of airplane and power plant that most affect commercial usefulness. It is more than three years since the duration record left American shores, and it has been more than doubled in that time. Its return is very welcome.

It is doubly welcome for being made with a fundamentally new type of engine. The Diesel principle is not a commercial monopoly. It is open to anyone. Already two different designs in America, and one or two in Europe, have been in the air. For certain purposes, at least, it seems reasonable to expect that its special advantages will bring it into widespread use. Every practical demonstration of the progress of the Diesel toward realizing its theoretical possibilities in the air as it has realized them on land and at sea is a bit of progress toward better and more economical commercial flying, and so benefits the whole industry. The fourth, and next main element in the demonstration will be provided when Diesels go into regular service on some well-known transport line as standard equipment, and the accumulation of data on performance under normal service conditions begins. We believe that that will happen before the end of 1932.

Aviation Training in Peace and War

Aëroplane, July 1. By Major F. P. Scott.—The various problems involved in the training of air-force personnel under peace and war conditions offer a very wide scope for the exercise of divergent opinions. The methods of instruction, the type of air-

craft used and the organization of training units are all subjects which gave rise to serious preoccupation on the part of every major belligerent engaged in the war 1914–18 and have found varying solutions in those countries under peace conditions since the war.

The extent of these differences of opinion can be appreciated if one compares a system of flying training which begins with the use of *rouleurs* and involves the successive use of several types of instructional aëroplanes, with a system such as has been employed in the R.A.F. since 1917.

It is a fact that certain principles of flying instruction which we regard as characteristically English have steadily been adopted or copied in whole or in part by most of the air services throughout the world, a fact of which we are naturally, if subconsciously, proud. But this refers only to actual methods of instruction, which have been in common use in England for a very long time.

As new generations come along it may be that the historical implications connected with this subject will be lost sight of and some of the lessons to be learned from a survey of historical facts will be overlooked until a new emergency imposes once again conditions similar to those of the last war.

The close identification of Avro aircraft with the training revolution which occurred in 1917, the enforced entire concentration of Avro production from that time to the end of the war on training aircraft and the consequent linking up of the fortunes and interests of the Avro Company with the training aircraft market has quite naturally impelled Avro design and policy towards the study and development of better training aëroplanes based on the same principles which history has so well vindicated. It has also led equally naturally to the study of the possible further application of those same principles which were originally evolved and practiced in respect of flying training only, to other higher, and possibly more important, branches and subjects involved in the training of flying personnel for military and naval duties.

A brief glance in very general terms at the progress of flying training during the war is advisable. Disregarding the very early stage when any available aëroplane had to be used, there was a considerable period up to the middle of 1917 when flying training involved the use of two or more different types of aëroplanes, when no telephones were used, when a pupil, instead of being *taught* by an appeal to his intelligence, generally speaking *learned* more by his power of imitation or the light of nature.

The demerits of that system for war conditions are obvious today. Only two of them, however, are of real interest at the moment:—

(1) The time involved in the training of a pilot before he could be available for active service.

(2) The duplication or triplication of personnel, material, and equipment used in instructional duties, with its consequences, viz., the diversion of manufacturing capacity from the production of service-type aëroplanes to the production of training aëroplanes, the lack of standardization in training aircraft and engines, the ratio of instructional personnel to pilots trained, etc.

It required Colonel R. R. Smith-Barry and the so-called Gosport methods of instruction which he conceived and put into practice, to bring about a revolution in training which was fundamental at the time. This still exercises its influence today. However, as invariably happens in all revolutions, political or otherwise, subsequent evolution and development sometimes tends to lose sight of some of the main principles involved.

The principles of war never change. The

radical change in actual methods of instruction evolved at Gosport under Colonel Smith-Barry's inspiration made possible and logically led to other equally important developments, viz.:

(1) The time involved in the flying training of a pilot was in exceptional cases as short as six weeks, including gunnery course and was made generally possible (given suitable organization) in eleven to twelve weeks, as compared with the previously existing twenty-eight or more weeks.

(2) One standard type of aëroplane could be, and was, used for flying training.

This brief survey of the progress of flying training during the war is not intended to be complete or exhausting, but merely to indicate one or two of the salient points. But it is essential to bear in mind that it was the so-called Gosport method of flying instruction, together with the existence of a training machine possessing certain characteristics, which made possible this remarkable speeding up of output of pilots, economy of material and personnel and a far higher standard of pilotage.

The training of flying personnel under peace conditions is of necessity very different from war conditions. Yet it is obvious and of very great importance that the contingency of war conditions should be ever borne in mind and that the whole system, methods, organization and material used in peace time should be readily adaptable for the exigencies of war conditions.

In peace, speed of output of pilots is of minor importance. In war, speed of output is of major importance. In peace-time training can be made more thorough. Time can be devoted to theoretical instruction. Flying instruction must of necessity be more leisurely as the same intensity of effort is not possible without war incentive. In war much theoretical instruction is dispensed with or is highly concentrated.

Again, in peace time, flying personnel can be and is subject to rigorous selection and this is a factor which is sometimes lost sight of. Under war conditions the same degree of selection is quite impossible and as many people as can be induced to fly must be trained, and trained quickly. At any rate, such is the lesson of the last war.

Under peace conditions it is possible to make the individual training of flying personnel almost all-embracing, in spite of the complexity of modern air force requirements, and the increased demands in training arising out of developments in wireless, instruments, navigation, and armament, as well as the development of fleet air arm work. But in war it is almost certain that training will have to be based on limited specialization and preparation for limited duties.

These general considerations lead to others—the output of pilots per aëroplane used in a given period; the effect of standardization of training material as to engines and air frames; the availability of ground personnel, both skilled and unskilled, and the ratio of this personnel to aëroplanes maintained in the air daily—are all matters which assume very different proportions and importance under war conditions from those obtaining under peace conditions.

The design and development of training aëroplanes can only be properly undertaken if the foregoing and similar considerations are borne constantly in mind. Avro training aircraft, whether intended solely for flying training like the Avro 621 (Tutor), or the Avro 626, faithfully reflect the same basic principles which the urgency of war conditions imposed in 1917–18. These, to a greater or less degree, will again be imposed in any future war of importance. The *raison d'être* of the air force and of air force training is preparation for the eventuality of a future war.

Speed of output of pilots involves one

all-through type of flying training aëroplane, a type which shall present the least difficulty to the young pilot in passing straight from it to war types (whether the latter be arranged for further dual or not) and a type of machine which shall present the least difference in size and general characteristics from those war types as is compatible with economy and the peculiar requirements of *ab initio* training.

The situation can be put in another way. It is possible to teach highly selected personnel to fly on almost any reasonable type of aëroplane fitted with dual control. The experience of war conditions shows that it is not possible so to teach all and any personnel without either wasting precious time in repeating instruction and using "step-up" or intermediate training types, or alternatively attempting to overcome the difficulty by making a very high figure of flying hours under elementary instruction, both dual and solo, an essential qualification before passing to war types of aëroplanes. Although it is possible to follow the latter course in peace time using almost any type of elementary training aëroplane, a very different situation will arise under war conditions when the right type of training aëroplane will be found to be a vital factor.

Thus the natural inclination towards the use of the lowest horsepower and the smallest size in aircraft as a medium for the training of military pilots, on the score of economy in initial capital cost, requires to be tempered by an examination of possible consequences under war conditions as well as in peace time.

With selected personnel it may be largely possible to pass directly to war types. Will it be possible with unselected and any personnel? Will intermediate or "step-up" types be found advisable and necessary when, owing to war conditions, such rigorous selection of personnel is no longer possible? How will this affect speed of output? Is it not better to minimize these doubts and risks, profiting by the lessons of the last war, and pin one's faith to the principle of an all-through type of flying training aëroplane, designed with a view to make all-through training possible not only for the selected personnel but for any personnel possessing characteristics more closely resembling those of modern war types and, finally, strong enough to stand up to service training conditions?

Tests of Service Airplanes

Bureau of Aëronautics, July 15.—The mission of the flight test section is to carry out the flight testing of airplanes, engines, accessories, and equipment and to submit proper reports thereon. Virtually all experimental machines, and the first airplane of each production contract is put through the program of tests and inspections on which is based the acceptance of the type for service use.

Following the contractor's demonstration, which is the first step of the program, and which is made by the contractor's pilot to demonstrate the probability of the airplane being able to meet its guarantees and to prove that it is a reasonable flying machine, and assuming that the demonstration has been satisfactory, the plane is delivered for trials.

Weighing of the plane, both in the empty and the full-load condition, to determine the position of the center of gravity, is then conducted, followed by complete photographing, covering not only the airplane with all its equipment in place, but also any item of unusual interest or peculiar construction which might be of future value. The plane is then ready for flight testing, climb, speed, stability, and maneuverability, and the determination of any special characteristics of the type.

The speed trials which include collection of data for a calibration of the airspeed meter for use in subsequent tests,

are carried out over an accurately measured course over the water adjacent to the shore line at a very low altitude. The pilot is provided with a special chronometric stop watch, recording time to the tenth of a second. The stop watch is mounted on a recording board which in turn is strapped to the pilot's leg. On this board, on the completion of each run over the speed course, the pilot notes the exact time over the course and the readings of the various other instruments during the run.

Normally the second test is that to determine the climb characteristics. In preparation for this test there will have been installed in the plane, two barographs, to constantly record the pressure altitude, a statoscope to establish the level flight condition, a thermometer to indicate free air temperatures, and in planes with a high ceiling, oxygen equipment for the pilot. So equipped, the plane is taken into the air and flown around at low altitude until the engine is properly regulated and warmed up. The machine is then brought close to the ground, the desired initial climbing speed is attained, the throttle is pushed wide open, and the stop watch started. From then on the pilot flies at an absolutely steady speed, varied slightly with change of altitude, and records the readings of his various instruments at fixed time intervals. This is continued until the indicated rate of climb is approximately that of service ceiling at which point the climb is stopped, and the descent made to the ground. Important data is taken on the way down, the pilot making full-power runs at frequent intervals to determine the maximum indicated speeds at each of these altitudes. The statoscope, which indicates the very smallest change of altitude, insures that the plane is neither climbing nor gliding when these latter observations are made.

A climb to the higher altitudes, such as is common for the small high-powered fighting planes is about as complicated an operation as one can imagine. To start with, the pilot is bundled up like an arctic explorer, with heavy fur suit and boots, a mask covering his entire face, and heavy gloves of leather and fur. With a ground temperature of perhaps 100°, the early part of the climb is consequently far from being comfortable. The air soon cools, however, and the body feels normal, but then a new complication enters—the air gets thin. The oxygen is turned on for just the normal flow when about 18,000 ft. up, and the outlet, a pipe stem, is held between the teeth. From then on the problem is of major proportions, for the pilot must accomplish the following operations continuously: watch and keep the oxygen flow such as to insure enough to sustain the body, operate the mixture controls of the engine to maintain the maximum engine power, fly at exactly the prescribed speed for the indicated altitudes, constantly observe all instruments, and every two minutes—absolutely on time—record the indications of not less than seven instruments, and all this to be done in a temperature which is probably close to 40° below zero.

Following the collection of data on the speed and climb flights, tests must be made to determine the stability and balance of the plane, and all maneuvers (acrobatics) expected of the type under test must be tried out as well as the tests of the bombing installation, the firing of the guns, the radio installation in flight, and all miscellaneous equipment and appliances actually operated to establish their suitability for service use.

Afterwards the test pilot must write a report covering the work he has accomplished in the air. All data collected during the testing of an airplane is put into standard form, "reduced" to standard conditions. Finally all test pilots must inspect every airplane in the greatest detail in order to recommend the changes and modifications they consider necessary

or desirable to best fit the plane for service use. These recommendations, together with the results of the flight trials, are the basis of a formal report on which the Navy Department determines its action with respect to any particular type of airplane.

New Metal for Airplane Construction

U. S. Air Services, July.—Allegheny metal, the new chromium-nickel alloy which startled the building trades by being chosen as the exterior finish of the Empire State Building in New York City, has now entered the field of airplane construction. A monoplane, said to be the first to use exclusively this metal for construction of its wing, was tested, recently, at Roosevelt Field. The new metal is not, they say, subject to atmospheric corrosion.

In this new plane, the first complete ship turned out by Fleetwings, Inc., the spars, ribs, tail services, trailing edges, control columns, and gasoline tank supports are all of Allegheny metal. The metal as used is of cold rolled strip and, according to the use, is .008 to .050 inches in thickness.

Besides being non-corroding, it is asserted that the new alloy has other advantages which make it ideal for wing construction. Although its specific gravity is that of steel, its tensile strength is about 190,000 pounds as compared with 55,000 pounds for strong aluminum alloys previously used. To equal the strength of the aluminum alloys, weight for weight, the alloy would have to have a tensile strength of about 149,000 pounds, so the new alloy has 40,000 pounds greater strength. Second, the yield point is close to the tensile. Third, it receives its high tensile from cold working, not from heat treatment, and therefore can be ordered from the mill with the correct physical characteristics and need not be treated after delivery.

It is also pointed out that where corrosive iron is used in the spars it must be sand-blasted after fabrication and then coated with red oxide, which is difficult in these complicated members, and expensive. So that, although Allegheny metal costs more to begin with, it is believed that there will be enough saving in operating costs, through eliminating heat treatment and corrosive treatment, to offset it. The wings in this new ship weigh 2.14 pounds per square foot, including the ailerons, gear, and fabric covering, and have more than passed the test of the Department of Commerce.

MISCELLANEOUS

Policies, Not Arms, Produce War

New York *Herald Tribune*, Aug. 1.—The pessimism of Frank H. Simonds introduced a note rather new to Williamstown into the open conference on disarmament at the Institute of Politics today. Clashes between slightly sentimental idealists and similarly ill-informed and dull reactionaries have been common enough in Institute discussions in the past, but an intelligent pessimism, forcibly expressed and backed up by first-hand facts, was so novel that while Norman Thomas, after his earnest and eloquent plea for disarmament, found himself sitting peacefully, with his audience in apparent agreement, Mr. Simonds, who followed him, was subjected to a fire of questions throughout what remained of the period.

Incidentally, this first open conference got over one of the weaknesses easily fallen into on such occasions—turning the so-called discussion, that is to say, into a mere lecture period. Last year, the open conference leaders frequently so crowded the two hours with their own set speakers that there was no time for questions or remarks from the house.

Mr. Simonds took the sardonically piquant point of view that not only was armament incidental and accidental in its relation to peace, but that reduction of armaments, in the present state of Europe, might even lead to armed conflict.

Europe was actually in a state of war at

present, he said, although not a gun was fired. It was divided into two hopelessly opposed camps, the one fighting to preserve the status established by the treaty of Versailles, the other convinced with equal passion that it could not sustain its national life unless the treaty were modified. The Polish corridor, as he had seen it during a recent visit, represented people in a state of war just as truly as did the towns along the French front in 1917. The same was true of the frontiers of Hungary. On both sides were policies, each logical and understandable, between which there was no apparent means of reconciliation.

The recent financial offensive of France against Germany was just as effective an offensive blow as the invasion of the Ruhr, Mr. Simonds said, and yet not a soldier moved; the cover was not taken from a single "seventy-five." Mr. Simonds said:

When, in March, Dr. Curtius, Foreign Minister of Germany, announced the intention of Austria and Germany to form a tariff union, the French accepted this notice as indicative of a purpose to violate the treaty of Versailles. Again France mobilized, concentrated, struck, this time at the financial, not the industrial life, of Germany. The result was the same. In less than 100 days, the time associated was the final act in the Napoleonic drama, German life was again paralyzed, German ruin was in sight.

Mr. Simonds drew a direct parallel between the manner in which Napoleon had attacked Wellington while attempting to hold the Prussians on his flank in check, with the manner in which French diplomacy had delayed matters, after the "flank attack" of the Hoover proposal, until its direct offensive against German finance had had time to do its work. He said:

And in the present case her offensive would have been just as effective if both she and Germany had been completely disarmed. Yet while the invasion of the Ruhr is cited as a classic example of the evils of armament and the ultimate proof of the need of disarmament, no one today is urging the abolition of money because France used money power to enforce her will. Armaments have nothing whatever to do with the situation between France and Germany. Two great peoples are at odds over issues, which to them spell life and death.

Mr. Simonds continues:

Disarmament today may lead directly to armed conflict. This is the case because, in the present state of the world, the most that is to be expected is reduction of armament. But at the moment, the nations which demand the revision of the peace treaties have put 170,000 troops together, the irreducible minimum necessary to keep domestic order. On the other hand the nations insisting upon the *status quo* maintain a round million. If there is any reduction, it must be in their armies. But as you reduce their armies you diminish the margin between the two camps. You do nothing whatever to diminish the purpose of the disarmed powers to obtain revision; you do nothing to reconcile the armed powers to revision, you only lessen the odds between the two groups, which are already at war. The war is there, it has been going on, but not with arms. You only make it more likely that arms will be used.

Again, when the United States appears at Geneva pressing for disarmament, she actually enters the war now in progress in Europe on the side of the disarmed powers. She asks their opponents to give up one of their means for resisting what they consider an attack upon their most vital interests, security for France, territorial integrity for Poland, existence, itself, for Czechoslovakia. What disarmament now means in Europe, in fact, is that of two groups of peoples actually at war, the means of one shall be greatly diminished and the chances of the other similarly enhanced.

If you cannot reduce the policies, reducing the armies is useless, Mr. Simonds declared.

It is worse than useless, because it is taking sides in a war, it is assisting in the defeat of one group of peoples not because you are opposed to the purposes of that group, not because you are in favor of treaty revision, for example, but because, in my judgment, you mistake the means by which war is carried on for the causes of war, because, in a word, you are ignoring the fundamental for the accidental.

NOTES ON INTERNATIONAL AFFAIRS

FROM JULY 3 TO AUGUST 3

PREPARED BY PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

FINANCIAL AID FOR GERMANY

THE GERMAN CRISIS.—The vital relationship between world economics and world politics was clearly brought out by the financial crisis which came with unexpected suddenness in Germany in the first two weeks of July, threatening to plunge Germany and all central Europe into social and political as well as financial chaos. The crisis took the form of heavy runs on all German banks and a flow of capital out of the country at a rate of $20,000,000 or more a day, the latter due both to withdrawal of foreign credits and efforts of Germans to get their money into foreign securities. The $100,000,000 short-term international credit to Germany, granted in June and falling due on July 16, was quickly exhausted. As emergency measures all German stock exchanges were closed, and German banks were shut up on July 14–15, opening subsequently in July only for necessary transactions such as handling of pay rolls, tax obligations, and unemployment dole. All holders of foreign money and securities were ordered to declare them and, on demand, to sell them to the Reichsbank at current rates. A thousand German banks and industries gathered together a deficiency guaranty of 500,000,000 marks ($119,000,000) which was placed at the disposal of a newly organized German rediscount bank and used as a guarantee for foreign loans and credits. Herman Schmitz, prominent German financial expert, was appointed Federal Commissioner of Foreign Exchanges, with the special task of handling the emergency measures to check the flow of capital out of the country.

It was felt at first that Germany's troubles could be solved only by a big foreign loan, the amount of which ranged in discussions from $200,000,000 to $500,000,000. On July 13, President Hans Luther of the Reichsbank made a hurried 23-hour airplane journey to Amsterdam and London, and thence to Paris, seeking financial aid from abroad. It was evident that, in any question of a large loan to Germany, France with her immense capital reserves would have the final say. But in Paris Herr Luther quickly found that France, while ready to consider a loan on the largest scale, was hedging this offer with a set of political demands which would have almost compromised German independence. These were: (1) abandonment of the Austro-German customs union; (2) cutting the second "pocket battleship" from her naval program; (3) effective measures against German nationalistic military organizations; (4) much stricter measures within Germany to prevent the flight of capital from the country. These conditions were condemned as

sharply in England as in Germany, and it was significant that neither the large long-term loan nor the French political demands appeared in subsequent negotiations. It became evident, however, that the efforts of politicians as well as bankers must be called upon to meet the German emergency.

CONFERENCE IN PARIS.—Preliminary to the London Conference set for July 20 a "get-together" meeting of French and German political leaders was arranged at Paris on July 18–19. Both Chancellor Bruening and Foreign Minister Curtius made the trip to Paris, and their conferences with the French government leaders were attended also by Secretary of State Stimson and Secretary of the Treasury Mellon of the United States, and Foreign Secretary Arthur Henderson of Great Britain. While no definite decisions were made at this four-power conference, it was felt that a beginning had been made toward a better understanding between Germany and France, and, in the words of the official *communiqué* after the meeting, conditions created "favorable to effective collaboration in both the political and economic fields." The *communiqué* read in its essential parts as follows:

> The German chancellor set forth the different aspects of the crisis from which his country is suffering. Representatives of the French government, recognizing the gravity of this crisis, declared that, under the reserve of certain financial guarantees and measures of political appeasement, it would be ready later to discuss the terms of financial coöperation within an international framework.
>
> Right now the representatives of the two governments have desired to underline their desire to create between them, in every possible measure, conditions favorable to effective collaboration in both the political and economic fields; and they have agreed to begin associating their efforts so that credit and confidence may be restored in an atmosphere of calm and security.

LIMITED AID FOR GERMANY.—Called by the British government for the specific purpose of giving governmental sanction to the modifications of the Young Plan brought about by the Hoover moratorium, the seven-power London conference of July 20–22 took on a larger importance from the German financial crisis which had developed in the ten days preceding. In addition to the American, British, French, and German ministers present, the meeting was attended also by representatives of Italy, Japan, and Belgium. Strongly emphasized in foreign press comment was the significance of the conference as marking the re-entry of the United States into active participation in international politics, signalized by the presence of both Secretaries Stimson and Mellon not as unofficial observers but as leading participants, and by the adoption of measures for renewal of international credits to Germany which were practically in accord with the "Hoover Plan" embodied in the instructions to the American delegates. The proposals drawn up by a committee of finance ministers and approved by the conference were in summary as follows:

1. That the governments of the United States, Belgium, France, Great Britain, Italy, and Japan extend an invitation to the Federal Reserve Banks of the United States, the Bank of France, the Bank of England, and the Bank for International Settlements to extend for another three months, or until November 15, the credit of $100,000,000 which they granted to Germany on July 15 for one month.

2. That these governments should urge their own banking institutions which have extended credits to Germany not to withdraw them.

3. That the Bank for International Settlements should select a committee to obtain coöperation for making an inquiry into the immediate further credit needs of Germany and, while providing for the renewal of the present outstanding German short-term credits, should prepare plans for the conver-

sion of some of these expiring credits into long-term credits.

While affording temporary relief for Germany and giving promise of future measures of assistance, the work of the London conference was regarded very generally in the European press as a postponement and alleviation of Germany's troubles, rather than an effective cure, which could be found only in a revision of the Young Plan. A German view of the conference was quoted in the New York *Times* of July 20 as follows:

The London conference gains greatly in importance through the presence there of the American delegates, but with the Young Plan excluded from discussion in line with the French demand, the results are bound to be abortive. A rediscount credit or other loans to Germany, the paper holds, will be in the nature of a morphine injection, willingly taken in case of desperate distress but of no lasting good, and in the long run Germany will have to look after herself. Germany must reorganize economically and politically, the paper affirms. But so must the whole world, since the capitalist system is fighting for its existence.

COMMITTEE ON GERMAN FINANCES.—At the close of July the board of governors of the Bank of International Settlements took steps to carry out the recommendation of the London conference that a committee be composed of "representatives appointed by the governors of the central banks interested" to make a further study of German finances and of methods of turning outstanding short-term credits into long-term credits. Germany named Herman Schmitz, her Federal Commissioner of Finance, and Karl Melchior, a delegate to the 1929 Young Plan conference, to act with this committee. The American delegate, appointed by the governor of the Federal Reserve Bank of New York, will be Albert H. Wiggin, chairman of the board of directors of the Chase National Bank. Some of the work of this committee had already been laid out by a "freezing commission" with foreign representatives, organized in Germany in July, which drafted plans for handling of foreign credits.

DEBT MORATORIUM IN EFFECT

FINAL AGREEMENT WITH FRANCE.—Definite agreement with France on the American proposal for a one-year postponement of all inter-governmental debts was finally announced on July 6. The principal points of the agreement are as follows:

First, that the payment of all international debts shall be suspended from July 1, 1931, until June 30, 1932.

Second, Germany shall pay the amount of the unconditional annuities of the Young Plan, but France agrees that the payments made by the Reich shall be placed by the Bank for International Settlements in bonds guaranteed by the German railroads.

Third, all the suspended payments shall bear interest on the conditions suggested by the American government and shall be amortizable in ten annuities from July 1, 1933.

Fourth, the same conditions will be applicable to the bonds issued by the German railways.

The arrangement for repayment in ten installments beginning two years hence was a compromise between the French demand for payment in three to five years and the American idea of a much longer period. Despite the agreement of July 6, there appeared still some uncertainty as to whether the moratorium should go into effect before its approval by the conference of July 20 in London. Great Britain, however, announced definitely that she would consider the agreement as effective from July 1, and would require no payments after that date. A committee of experts to consider details of putting the moratorium into effect met in London on July 17 under the chairmanship of Ambassador

Hugh Gibson, but at once adjourned until after the London conference.

EUROPEAN POLITICS

SYNDICALIST DISORDERS IN SPAIN.—Against strikes and syndicalist demonstrations in Seville and other cities of Spain during July the Republican government took vigorous action, arresting Dr. Vilana, chief syndicalist agitator in the southern region, and destroying a communist headquarters tavern near Seville with machine guns and artillery. After arresting more than 1,000 persons, the government declared that the "revolutionary strike" was under control. From the radical side in the Cortes there was much criticism of these sharp measures, and it was felt that this and the steady decline of the peseta to a point below eleven to the dollar might threaten the fall of the Republican cabinet. It was given a vote of confidence in the Cortes, however, at the close of July. Political sentiment in Spain is described as strongly leftward, but not as yet beyond the safe limits of Marxian socialism.

PAPAL ENCYCLICAL STIRS FASCISTI.—Hopes of an early settlement of the revived quarrel between Pope and State in Italy were quashed at least for the present summer by the 15,000-word papal encyclical of July 4 "Concerning Catholic Action," which vigorously denied the Fascist accusations against the society and declared that under cover of these false charges the Italian government was seeking to wrest from the Church all influence over the youth of Italy. Certain doctrines of Fascism were declared subversive to religion, and good Catholics taking Fascist oaths were advised to do so with mental reservations.

The encyclical not only brought negotiations to a halt but stirred the directorate of the Fascist party to a counterblast which hotly denied the statement that members of the party took the Fascist oath for self-seeking purposes—"for bread, or career, or life"; branded as false the charge that Free Masons were admitted to the Fascist ranks; and protested against attacks, alleged to have been inspired by the Vatican, on the Balilla organization as harmful to Italian youth. The directorate took measures to extend Balilla to include all young Italians, appropriating $50,000 for a special bureau of Balilla propaganda. In comment on this Fascist manifesto the Pope remarked mildly that it was "less grave than it might have been" and was after all a party rather than a governmental pronouncement.

NORWAY DISPUTES GREENLAND AREA.—An old dispute between Denmark and Norway was revived in July when a privately organized Norwegian expedition raised the national flag on a strip of east Greenland coast, anticipating in this way a Danish official expedition sent to explore the same region. On July 10 the Norwegian government gave official notice that it had occupied the coast between lat. 71° 30′ and lat. 75° 40′. Though the ancient Norwegian colonies in Greenland, Iceland, and the Faroes were surrendered to Denmark in the separation treaty of 1814, Norwegian hunters and fishermen have plied their trade on the Greenland east coast and established bases there throughout the nineteenth century, so that there may be some basis for the Norwegian claim of at least joint rights with Denmark. Foreign Minister Braadland of Norway explained his government's action as purely technical, with a view to future discussion of the question before the World Court.

ACTIVITIES UNDER THE LEAGUE

FRENCH ARMS REPORT.—The French memorandum to the League of Nations Secretariat furnishing armament information for the approaching limitation of armaments conference was published on July 20. Unlike the American memorandum which preceded it, and which was

simply a schedule of existing armaments, the French note omitted detailed data and presented instead a long argument on the familiar French thesis that French armaments cannot be reduced without further guarantees of security—in other words, that reduction of military forces can be accomplished only by political agreements. Specifically France declared that her army had been reduced by half, that one-third of her military forces must be considered unprepared because in process of training, and that her armaments in general were at a minimum under existing political conditions.

NARCOTICS TREATY.—On July 13 twenty-eight out of fifty-seven nations engaged in negotiations at Geneva for control of narcotics manufacture, signed a convention which was described as a great advance on all former efforts in the same field. The convention presents an elaborate list of drugs to which it applies, includes codine for the first time, and, in general, provides for a complete accounting of narcotics manufacture in order to assist governments in combating illicit traffic. The convention will go into effect when ratified by twenty-four nations, including at least four of the chief manufacturing countries —the United States, Great Britain, Germany, the Netherlands, France, Turkey, Switzerland, and Japan.

In a special section of recommendations the convention suggests central narcotics authorities for states not already possessing such bodies, and also state monopolies over narcotics manufacture and traffic.

UNITED STATES AND LATIN AMERICA

REVOLUTION IN CHILE.—On July 26 President Carlos Ibanez of Chile was forced to resign from office after delivering over the government to Pedro Opazo, President of the Senate and his constitutional successor. The overthrow of the Ibanez government followed a period of increasing financial difficulties and popular discontent in Chile, marked towards the end by student uprisings which were supported by the professional classes and a majority of the civil population. Since his election in 1927 President Ibanez had ruled with an iron hand, banishing political opponents, eradicating the old bureaucratic system, abolishing sinecures in the interests of economy, and embarking on an ambitious program of irrigation, highway construction, and similar projects. The debts contracted abroad, chiefly in the United States, and amounting to about $560,000,000, were a factor in his downfall. In February last the President secured from Congress full power to take all measures of administrative or economic character which he considered necessary, for a period of four months. Shortly before his resignation he declared a moratorium on Chile's foreign debt, to extend at least until August.

After the resignation of Ibanez and his exit to Argentina, his successor Opazo was also quickly forced out of office and the presidency was taken temporarily by Estiban Cabero, formerly head of the Chilean cabinet.

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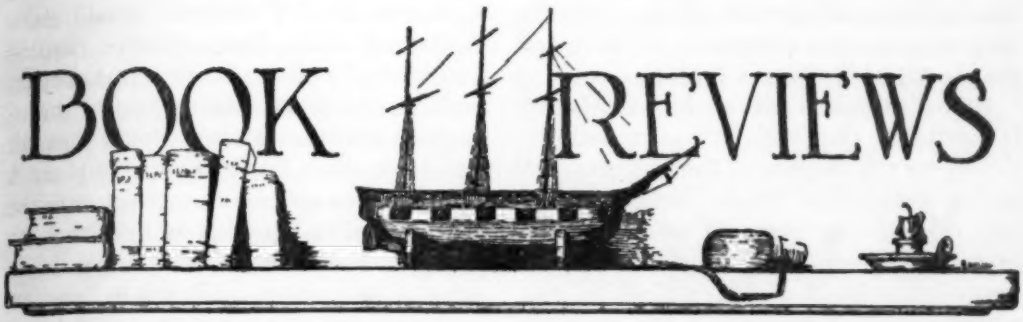
BOOK REVIEWS



Members of the Institute may save money by ordering books through its Book Department, which will supply any obtainable book. A discount of 10 per cent is allowed on books published by the Institute, and 5 per cent on books of other publishers (government publications excepted). Address Secretary-Treasurer, U. S. Naval Institute, Annapolis, Maryland.

MEMOIRS OF PRINCE VON BULOW, 1897 TO 1903. Translated from the German by F. A. Voight, Boston: Little, Brown, and Co. 1931. $5.00.

REVIEWED BY LIEUTENANT COMMANDER SCHUYLER MILLS, U. S. NAVY

"William II takes everything personally. . . . He endures nothing that is boring . . . too serious people get on his nerves. . . . His majesty needs praise every now and again . . . You are Kaiser William II's last card." These lines were written to Bernhard von Bulow when, in 1897, he was called to the post of Secretary of State for Foreign Affairs and was already mentioned by those close to the court as the successor to the aged Chancellor, Prince von Hohenlohe. Throughout this volume the Kaiser is the central figure. He is depicted as a brilliant man, charming to those close to him, interested in everything under the sun, lovable, and unusually intelligent, but given to illusions and false logic, vain and jealous of those who seemed to outshine him, erratic and neurotic. His principal failure as a ruler was lack of self-confidence. He was as brilliant a talker as Theodore Roosevelt and had the same gift for terse expression that lends itself so readily to quotation. He was liable to be carried away by his enthusiasm for expression beyond the bounds of discretion. The long list of his "breaks," including the famous "Hun" speech is given at length and the political effects of them are discussed. Prince Hohenlohe felt grave concern about the Kaiser's sanity, but Bulow insists that the Kaiser was sane, although neurotic and erratic, which, he admits, is a rather fine distinction.

In his official capacity, Bulow accompanied the Kaiser on his visits to other countries. He met and talked with Queen Victoria, King Edward, the Tsar, and all the principal statesmen, politicians, and social leaders of Europe. He recounts his conversations with them and discusses their personalities with complete frankness. It is these personal incidents, so well told, that make the book a fascinating one to read.

This volume is the first of a series of four giving the recollections and the comment of Prince von Bulow, who spent his early life in the German diplomatic service, took charge of the Foreign Office in 1897, was chancellor from 1900 to 1909, when he retired and remained an observer of the downfall of Imperial Germany. The author wrote and revised his manuscript very carefully, and then held it for publication until after his death, which occurred in 1929. As it represents the mature judgment of a man of great experience, who had himself felt the restraints of responsi-

bility, his comment should receive the most serious consideration. It is of intense interest to those who care for the study of the genesis of the World War.

Bulow's thesis is that nothing in history is inevitable, that the war was caused primarily by the stupidity of his successor in giving Austria the "blank check" in 1914 and, to cap the climax, permitting Germany to shoulder the blame by a premature declaration of war. He maintains that neither the Kaiser nor the German people wanted war, but were permitted to drift into it through the folly of its leaders. This particular volume covers the period from 1897 to 1903, the time up to 1919 and the earlier years being the subject of the other three volumes not yet translated. A few years before the commencement of this narrative the Kaiser had dismissed Bismarck and had radically altered the former policy of Germany by failure to renew the Re-insurance Treaty with Russia, thereby permitting the latter to form the alliance with France. The Iron Chancellor was still alive and fiercely critical. The Kaiser was jealous of Bismarck's great reputation and strove to show that he was capable of managing affairs. Bulow was a pupil of Bismarck in that he believed that it was vital to Germany's interests to maintain peace with Russia at all costs. Unlike Bismarck, he believed in the then popular doctrine of economic imperialism and felt that the "will to power" of the German people should be recognized by the acquisition of commercial concessions and territory over seas. The logical result of this policy was the expansion of the Navy and the consequent rise of distrust of Germany on the part of England.

The attempts to gain the "place in the sun" (a phrase coined by Bulow) resulted in some undignified fishing in troubled waters, as at Manila in 1898; some futile results, as in the acquisition of a number of small islands in the Pacific; and the arousing of considerable controversy, as in China. In 1898 the German naval leaders were convinced that Spain would make short work of the United States, particularly in the Far East. It was felt that Spain could not hold Manila long against the insurgents and that Manila would then fall into Germany's hand like a ripe plum. A squadron was ordered there to observe the fighting and to be ready to take over the Philippines as soon as the time should come. Bulow's account is not in exact accord with the facts and his comment on Admiral Dewey's action is unfair, as plenty of time was available for changing the orders for the squadron after receipt of the news of the result of the Battle of Manila Bay, before Germany became involved. Bulow is quite frank about the purpose he had in mind when the squadron was ordered to Manila. The matter was soon settled, but the memory remained to trouble relations later.

The question of the future of the German Navy came up in 1898. Bulow proposed that the new ships should be built for coast defense only, but gave way before the masterly presentation of the case for the battleship by Tirpitz. He did make a proviso that the building of battleships should be given as little publicity as possible and that the subject of defense should be stressed. He gives a very interesting and sympathetic picture of Tirpitz, adding that the Admiral's great interest in the Navy made him blind to other interests so that he frequently urged policies that were against the interests of the nation as a whole.

The most vital decision in foreign policy during this period was the refusal of English proposals for an alliance. Bulow's action in this matter seems sound, considering the conditions that obtained at the time. England was so unpopular in Germany on account of the Boer War that King Edward was hissed on the streets when he came over to see his sister on her deathbed. The long-standing enmity be-

tween England and Russia might easily have involved Germany with the latter nation without any recompense. It seemed impossible that France would ever forgive England for the Fashoda incident. Bulow did not trust the sincerity of Chamberlain or his ability to persuade both parties in Parliament to accept an alliance. He complains about the Germans being sentimental in their consideration of foreign affairs and maintains that one should be guided by interest and cold reason alone, yet he considered sentiment too strong for France and England to make up their differences, or for England to abide by a fair agreement with Germany.

In the matter of internal affairs there was a constant struggle to control the hasty enthusiasms of the Kaiser and then to explain away to the Reichstag the "breaks" that the latter did make. The speech to the regimental mess where the Kaiser boasted that the regiment was ready to shoot down the socialists at his command and that of his allies, God and the Great Elector, caused more trouble than the "Hun" speech did. The tariff was increased in order to protect home industries, but the need of a balance between manufacturing and agriculture was recognized by giving protection to the latter. That was a great source of strength to Germany during the war, for had she gone as far as England did in the matter of fostering industrial growth, she would have been in a much worse position as a result of the blockade.

In this volume we see the groundwork of German pre-war policy laid down, the decision to expand, to enlarge the Navy, and to avoid closer relations with England. The later volumes will show the development of this policy. It was admittedly a dangerous one, and one that required a sure hand and careful judgment if disaster were to be avoided. In the hands of a bungler such a policy would be fatal. If the later volumes are written with the same charm and deal with events and persons with the same frankness, the entire set will be one of the best and most interesting of all works dealing with the origin of the World War.

H.O. NO. 209—POSITION TABLES FOR AËRIAL AND SURFACE NAVIGATION. By Commander M. R. Pierce, U. S. Navy. Washington, D. C.: Hydrographic Office. 1931. $.75.

REVIEWED BY COMMANDER H. H. J. BENSON, U. S. NAVY

Commander Pierce's "tables and their method of use were devised" by him "when he was navigator of the dirigible, U.S.S. *Los Angeles*." These tables may be used for all latitudes and "the method of solving for line of position is uniform throughout." They are published in a convenient-sized book of 223 pages.

After obtaining the Greenwich and local hour angles the computed altitude may be obtained with only two entries in the tables, three quantities being picked out at the first and two at the second. These last two are the computed altitude and the azimuth. It is a particular advantage to obtain the azimuth so readily and rules for naming it are simple and printed at the foot of each page. It is seen that this is a very short method.

Table I being tabulated in tenths of degrees, "when the celestial body is near the meridian an error of two or three miles may occur when working a sight of sun, star, planet, or moon," unless one resorts to interpolation. That slows up the work somewhat. The surface navigator will find it necessary to interpolate and it is doubtful if the aërial navigator should deliberately throw in an error of three miles which may add to "the probable error due to observation with a bubble sextant." Table IA is arranged for certain stars based on their positions in the heavens in 1935. As several of these stars change in declination more than 19″ annually, perceptible error may

result in other years as the body approaches the meridian. A list of stars included in Table Ia would add to its convenience and if the annual variation in declination were given one could be governed thereby.

In Table II the calculated altitude is tabulated to whole minutes and the azimuth to degrees, and as the intercepts frequently are long, another error of over half a mile may result. The assumed position does not as a rule fall on an even degree of latitude or longitude. This lengthens slightly the time required to plot it. These tables may be used for obtaining great-circle courses and distances and other purposes but the author has wisely left out examples of such uses because "more suitable means" are available elsewhere.

Commander Pierce's method is an excellent one for solving quickly for the line of position. It is certainly one of the shortest, possibly the shortest, for all usual conditions. The navigator will know when to be satisfied with the degree of accuracy which he may obtain.

PILOTS HANDBOOK, 1931. Prepared by the Weems System of Aërial Navigation. Los Angeles: Pilots Handbook Publishing Co. $7.50.

REVIEWED BY MAJOR FOLLETT BRADLEY, AIR CORPS, U. S. ARMY

This book, just published, is designed to teach the cross-country pilot navigation in its various phases, and to deter the tyro in aerial navigation from attempting flights beyond his skill and experience. It is divided into seven parts and has, in addition, a complete set of maps of the United States on the mercator projection.

Part I is devoted to navigation proper, and is subdivided into twenty-three chapters. The first ten chapters comprise an explanation of ordinary "piloting" and dead reckoning, and the remaining chapters explain the Weems system of celestial navigation. All fliers must understand and apply "piloting," and to some extent dead reckoning, on short cross-country flights. The term "piloting" as used in the handbook, is unfortunately confusing to those land airmen to whom the term means the flying of the airplane. The author is a naval officer and was an experienced marine navigator before he devoted his attention to aërial navigation. He has incorporated in his terminology the sea going meaning of the term. "Piloting is flying from one place to another by identification of landmarks." Celestial navigation is essential when over clouds, large expanses of water, or uninhabited and uncharted wastes of land. It is not used (except in training and preparation for such flights) when the pilot is able to establish his position by means of maps, compass, and frequent landmarks distinguishable from the air.

The chapters on the compass and its errors, and course plotting and correction are invaluable to all cross-country pilots. The chapters on dead reckoning and celestial navigation have really reduced to a simple, practical method, those complicated mathematical processes formerly necessary to find one's position from sextant observation of the sun, moon, planets, or stars.

Part II is on meteorology. The handbook would be materially improved by the revision of this part along the lines of less erudition, and more practicality. The student who cares to delve into the theories of thermodynamics as applied to meteorology would not object to seeking his information elsewhere.

Part III is an adaptation to cross-country flying of the *Automobile Blue Book* route directions. "Speedometer reading 5.6 miles, white schoolhouse on left. Turn right—etc." The handbook calls these "plotted courses" and lists 129 of them, each course being listed in both directions. It would be advisable in the next edition of the handbook to explain that these plotted

courses cannot stand alone as the sole means of "flying from where you are to where you want to go," and to show in some detail how the information shown in them is to be used in conjunction with piloting by map and compass. The difficulty in depending solely on the plotted courses lies in the fact that they furnish no aid to the pilot who has gotten off his course. Future revisions of the handbook should omit reference to indistinct landmarks, and should lay greater stress on landmarks prominent from the air. As examples, one plotted course notes a highway fork as a landmark in terrain filled with highways, but with none outstanding. Another tells the pilot to cross a railroad at Podunk (a hamlet of only a few houses and not shown on the map), but fails to mention another fair-sized town only a few miles away through which two intersecting railroads pass. It would be highly advisable for an experienced cross-country pilot to fly each course and note for incorporation in the tables, those landmarks that are prominent from the air at low altitude.

Part IV is called American Airports. This name is not indicative of the substance matter, for whereas one would expect to find here a list of American airports, he finds instead an excellent and valuable article on the considerations and factors involved in the selection and construction of an airport.

Part V is a list of airports in the United States arranged alphabetically by states. This is a valuable table, and well worth inclusion in the handbook.

Part VI is a very valuable compendium of information on such subjects as: air commerce regulations; licenses and certificates; clearance and entry; parachutes; gliders and gliding; airway schedules; air markings; schools; and lists of approved aircraft and aircraft engines.

Part VII is a buyers' guide, "containing a complete directory of where to buy everything from cotterpins to transport liners."

The handbook incorporates a map of the United States on the mercator projection in twenty-one sections. There is no question that the mercator projection is the best for navigation, particularly celestial navigation. However, the avowed purpose of the chief cartographer of the maps is only partially correct in its conception. He says:

> We may briefly mention here that while there is need of frequent landmarks, etc., on the ground, the greater visibility in the air permits the cartographer to forego mentioning the less essential landmarks, and to limit himself to the more prominent ones, thereby bringing about greater legibility, the lack of which is one of the incidental points of criticism of existing flying maps.

He is most certainly correct in his aim of legibility, but the draftsmanship of the maps is poor, the lines and names of places are much too heavily drawn, and the scale is so small that the cartographer has not attained his end of legibility.

It is a mistake to have included, as part of the book, the file of flying maps. They practically double the thickness and weight of the volume and make it more difficult to handle and read. Furthermore, as maps are withdrawn for use in actual flying, the file will soon be incomplete. The maps should be referred to in the book, but sold separately. There should be included in the book for reference only, maps of foreign countries, the more readily to locate places mentioned in foreign aviation news.

The reviewer is tremendously impressed with this book and believes it an invaluable contribution to aviation. Imperfections in the first edition of a work of this nature are bound to occur, and the remarkable thing about this text is that it is so good in its first edition. It deserves a place in every flying office, and in the private library of every pilot desirous of perfecting himself in cross-country flying.

NAUTICAL DIAGRAM. Invented and copyrighted by Captain W. Dekema. Los Angeles. Mounted $3.50; unmounted $2.50.

REVIEWED BY COMMANDER J. A. LOGAN, U. S. NAVY

Captain Dekema's "Nautical Diagram" is a sheet on which is printed the diagram with the explanation of its use. The diagram itself is a system of curves on cross-section paper, and these lines give a graphic solution of the astronomical triangle. The sheet is sold mounted or unmounted. In addition to this basic sheet, are two separate sheets; the first containing illustrated examples, and the second containing tables for converting time into arc and vice versa and altitude corrections for sun, moon, planets, or stars. If the basic sheet is mounted it would seem well to paste the auxiliary sheets on the back of the board.

The elements used are latitude, declination, hour angle, altitude, and azimuth combined with two undefined elements *B* and *C*. The explanation is clear as far as it goes, but there is nothing to show how the data for preparing the diagram was obtained. This makes its use uncertain under special conditions such as when the declination is zero and when the hour angle is 90°. In this case a small error in either will make a large error in the value of *B* and *C*.

Except as noted in the preceding paragraph, the diagram is accurate within six miles for a single line of position—the limits claimed. Whether these limits are sufficient is open to question. The circumstances would have some bearing on this question which would seem to be one to be decided by the person responsible for the use of the diagram.

The time consumed in solving an ordinary line of position is about the same as that consumed by other short methods. With zero or 90° values, the time becomes longer because of unfamiliarity of treatment.

The rules for marking the various elements are simple and natural, except that the azimuth is reckoned always from the south pole, whereas most navigators are accustomed to reckoning it from the north pole.

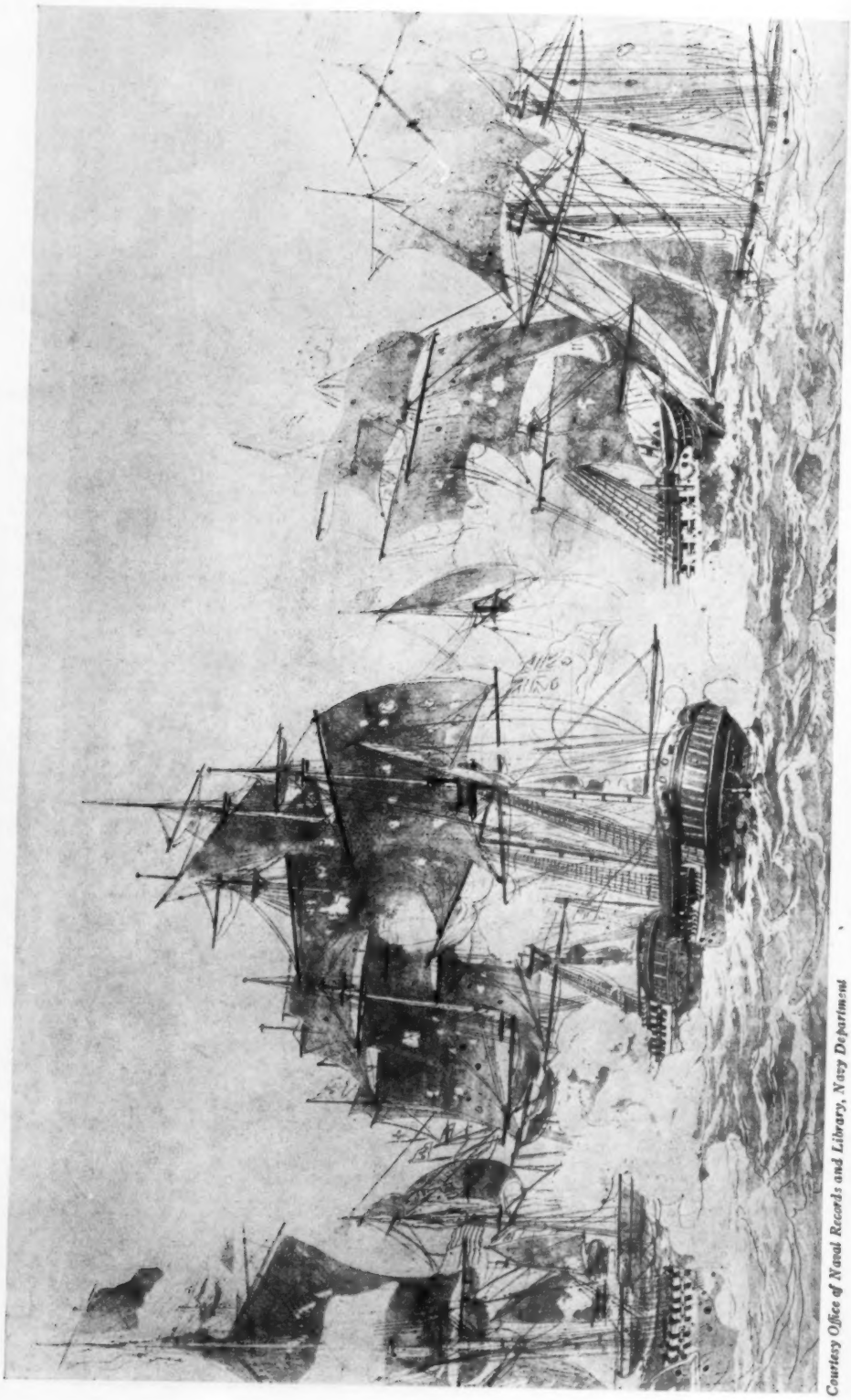
The greatest value of the diagram seems to be its use for obtaining all kinds of great-circle data. These data are obtained with ease, except when the intersections come in the lower right-hand corner. In this connection, however, it would seem well to stress the necessity of care in using the proper signs for the various elements, and the necessity of watching the initial course in deciding on the direction to apply the "DLong."

Its use is somewhat more of an eye strain than the use of tables; and to prevent errors, care is required to erase all marks from the diagram as soon as they have served their purpose. This constant erasing makes the life of a single sheet fairly short.

Courtesy Lieutenant Thomas Macklin, U. S. Navy

EXTRA DUTY

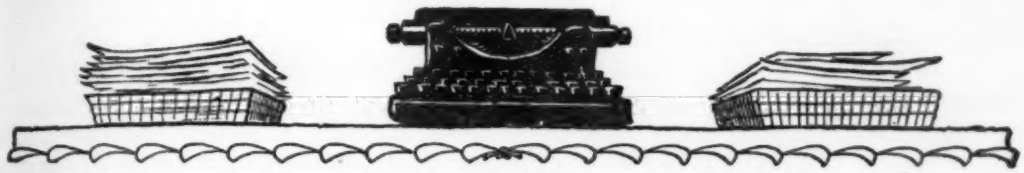
A mine sweeper assists a liner to her dock.



PERRY'S VICTORY

Courtesy Office of Naval Records and Library, Navy Department

SECRETARY'S NOTES



Perry's Victory A few weeks ago the rotogravure sections of many leading Sunday newspapers carried pictures of a granite shaft 352 feet high that overlooks the scene of the Battle of Lake Erie. This memorial that commemorates the naval victory has been referred to as a memorial that commemorates a pioneer step in the maintenance of peace through disarmament. It would be well if our fellow-citizens could also realize, as naval officers do, that the Battle of Lake Erie illustrates that the outcome of battles may be largely determined before a gun is fired. Most school boys know of the melodramatic features of that naval victory, which fire the imagination. Theodore Roosevelt in his *Naval War of 1812* writes that Perry occupies an undeservedly high place in American histories for his victory was won over an inferior force. But did Roosevelt, or other historians, or school boys, or those who looked at the rotogravure pictures, or those who saw the recently erected memorial, appreciate the significance of the work done by this twenty-eight year old officer in *preparing* for battle? When he arrived on Lake Erie in March, 1813, he did not have a superior force. The timbers of his ships were then in the forest. It was the spirit, foresightedness, and energy of this hitherto inconspicuous young officer, in *building* and *fitting out* an effective flotilla, that made the decisive victory.

How Many Can We Answer? Recently two naval officers were discussing professional questions concerning which many of us have vague ideas gathered from the press or from hearsay, but upon which we find it difficult to get authoritative answers. One of these officers made a list of subjects (that is far from complete) that interests nearly all of our officer personnel. Nearly every one may know the answer to some of these questions. Is there any one who can answer all of the following?

(a) What was the lesson learned from the Lake Denmark disaster?

(b) What has been done to facilitate the rescue of personnel from sunken submarines so as to avoid repetition of the *S-4* disaster?

(c) Why is the *New Mexico* being fitted during modernization with geared turbines instead of electric drive, which she already had?

(d) What was the lesson learned from the Honda disaster?

(e) Why is the *Pennsylvania* to be fleet flagship instead of the *Chicago*, which was originally scheduled for that purpose?

(f) Why was the Naval Mission to Brazil abolished? (Economy is generally assumed as the reason and it is not known that a Minister of Marine of the new government resigned in protest at the withdrawal.)

PERRY'S VICTORY
Courtesy Office of Naval Records and Library, Navy Department

(g) What is the present status of the Naval Mission to Peru?

(h) What condition was discovered on a battleship relative to the action of high frequency radio on nearby turret guns and airplanes?

(i) What was the lesson learned from the use of the *Los Angeles* at the fleet concentration in Panama?

(j) What has been the effect of "blisters" on the maneuvering qualities of battleships, and seaworthiness, etc.?

(k) In what principles of international law concerning maritime warfare are we at variance with other countries?

Army Ordnance Association

The Board of Control has accepted the invitation of the Army Ordnance Association for the Institute members to be the guests of that organization at its annual meeting in Washington and at the Proving Ground, Aberdeen. As many of our readers know, the Army Ordnance Association is an organization of those in and out of the military service who coöperate with the government in maintaining industrial preparedness for war. The Association's principal objective is to keep an active membership of those American citizens on whom the duty of design as well as production will fall in time of war, and who will have an authentic knowledge of the complex requirements of war.

The day at Aberdeen is devoted to showing and firing all types of Army ordnance from rifles to 16-inch guns. Pictures of some modern ordnance equipment appear on pages 1245–52 of this issue.

The Ordnance Association is mailing individual invitations, *Identification certificates*, together with detailed information, to all Institute members on shore duty, or resident in North Atlantic states. Any of our members on sea duty or any on shore duty who do not receive invitations by September 20, and who desire to witness the demonstrations at Aberdeen should write to the Secretary of the Naval Institute and he will insure that an invitation is sent. The following information has been furnished us by the Army Ordnance Association:

The sessions of the thirteenth annual meeting of the Army Ordnance Association, in which the National Industrial Conference Board and the United States Naval Institute will participate, will be held on October 7 and 8, 1931. A business and technical session at which addresses and technical discussions will be presented by distinguished speakers and noted ordnance authorities will be held in the auditorium of the U. S. Chamber of Commerce Building in Washington on Wednesday, October 7, at 8:00 P.M. The usual program of current tests and demonstrations will be held on the following day, Thursday, October 8, at the Aberdeen Proving Ground, Maryland, beginning at 10:00 A.M. and concluding at 7:30 P.M.

Through the courtesy of the Secretary of War the Association is privileged to invite its members and guests to the Proving Ground each year to witness current tests of experimental and standard items of ordnance and other Army equipment. These annual demonstrations, which are participated in by practically every branch of the Army, have become the foremost exhibitions of fighting equipment the world over. The purpose of the demonstrations is to acquaint engineers and executives of American industry, through observation and study, with the current requirements of munitions preparedness.

Tickets of admission will not be required. A special area on the Main Front at the Proving Ground will be reserved for members of the Army Ordnance Association and their guests. Admission to this area will be by presentation of membership card or by other satisfactory identification. Officers of the regular Army, National Guard, and Reserve Corps in uniform will be admitted to this area.

Members of the Army Ordnance Association, the National Industrial Conference Board, and the United States Naval Institute can travel to both the Washington and Aberdeen sessions or to either at reduced fare by presenting their *Identification Certificate* to the local railroad ticket agent at practically any point in the United States. Members from northern and eastern points attending the Washington session may purchase a round-trip ticket to Washington with stopover at Aberdeen, Maryland, on return. Members from western and southern points attending the Washington session may purchase a round-trip ticket to Aberdeen with stopover at Washington, D. C. Round-trip tickets using the *Identification Certificate* may be purchased at one and one-half times the one-way fare.

Certain regular trains on the Baltimore and Ohio and Pennsylvania Railroads will make special stops at Aberdeen on October 8. An Army Ordnance special train of Pullman sleeping cars will be operated from Pennsylvania Station, New York, New York, to Aberdeen Proving Ground and return, October 8. This train will be open for occupancy at 10:00 P.M. October 7, and will leave New York for Aberdeen shortly after midnight. Those who desire to travel on this train should order accommodations from the Secretary, New York Post, A.O.A.

It is contemplated that special cars will be operated from Springfield, Massachusetts, Pittsburgh, Pennsylvania, and Cleveland, Ohio, for the Aberdeen session. Those interested in securing accommodations in these cars should address: from Springfield, the Executive Assistant, Bridgeport District Ordnance Office, Springfield Armory, Springfield, Massachusetts; from Pittsburgh, the Secretary, Pittsburgh Post, Army Ordnance Association, 1014 Diamond Bank Building, Pittsburgh, Pennsylvania; and from Cleveland, the Executive Assistant, Cleveland District Ordnance Office, 1524 Keith Building, Cleveland, Ohio.

For the accommodation of those traveling on the New York special train a dining car will be available for the service of breakfast, dinner, and supper at the Proving Ground on October 8. No advance reservation for these meals will be necessary. Dinner and supper at the Proving Ground will not be served by caterer as in previous years. Concessionaires will be at the Proving Ground to serve sandwiches and light refreshments throughout the day. Guests may also utilize the limited facilities of the Post Exchange for light luncheon and supper.

Cruisers We have all read and heard many comments about the defects of our modern cruisers. Some of these have been particularly critical; and too few seem to appreciate basic causes. One wonders how many of the critics realize the complexity of the art of building a man-of-war, and how necessary it is to keep building ships in order to build the best ships. Materials, requirements, designs, change with progress, and constant experience is essential if advantage is to be taken of progress in many fields. The best can be produced only by improving on something that has gone before. The British have been rather more fortunate than ourselves in being able to build cruisers continuously; and thus being able to incorporate in each new ship the changes in design that experience gained from previous ships had proved desirable. The following extract from a leading London newspaper shows something of what a continuous cruiser building program has been in effect:

With the passing into service of the *Exeter* there is no cruiser for the Royal Navy in the completing stage, the first time this has happened for many years, or since long before the late war. For seven years after the Armistice there were vessels on hand from War programs, which were completed at a leisurely rate. In 1924 the cruiser replacement program was started, and continued by modest annual instalments until 1929, when the present government cancelled the building of the two cruisers, the *Surrey* and *Northumberland*, authorized under the 1928 estimates. These ships would now have been in the fitting-out stage to succeed the *Exeter*, but as it is there will be no new cruiser coming into service until 1933,

when the *Leander* is due for completion. She is being built under the 1929 program, and is not yet launched.

Fillers For a long time the partially filled page at the end of each article in the PROCEEDINGS was left blank. In recent years we have been filling this space with a tailpiece of some sort, as that seemed more decorative and pleasing to the eye. In this issue we have tried filling this space with quotations from various authors. These extracts have no connection with the articles that precede them but are all relative to matter that concerns our readers. We have available a considerable number of such quotations on wide fields—strategy, tactics, politics, economics, command, policy, etc. If the use of these extracts meets with the approval of our readers, we shall continue using them.

"Old Ironsides" Booklet The little booklet, *Some Stories of Old Ironsides*, that we published last month, contains nothing new to naval officers, but the stories are interestingly told and the eight duo-tone illustrations add much to the attractiveness of the pamphlet which carries on its cover a colored picture of the *Constitution*. The booklet is being sold by the ship's service of the *Constitution*, as well as by the Institute office for twenty-five cents. All profits will go to the Navy Relief Society.

That this little pamphlet is attractive and merits success is illustrated by the fact that the first edition of 5,000 copies was completely exhausted in less than three weeks. On the *Constitution* itself the sales exceeded 300 copies per day. We have received inquiries as to the cost per hundred for furnishing copies to school children.

Certainly no boy, (and few adults), would fail to enjoy the stories. They are based on chapters in Commander Frost's book, *We Build a Navy*, that the Institute sells at $4.00 (10 per cent less to members) a copy. We hope and expect that the booklet will perform a real service in aiding the *Constitution* in its mission of carrying a message from our Navy to our people.

Type and Paper You have noted the change in type and paper. If this proves beneficial we shall make the changes permanent. Our earnest endeavor is to see that the members get the best magazine that the financial condition of the Institute permits. We habitually lose money on the PROCEEDINGS, but make a very small profit on our book business. The loss is made up from the income on the Institute's invested funds.

Disarmament May Produce War Did you read the views expressed by Mr. Frank H. Simonds at the Williamstown Institute of Politics? Mr. Simonds is a veteran newspaper man and war correspondent whose writings have been widely read for many years in certain syndicated newspapers of America and Europe. He suggests that, although there has been no formal declaration of war, such a state actually exists in parts of Europe at present. The chief weapon at the moment is financial but Mr. Simonds believes that undue reduction in armaments may lead to physical conflict. Perhaps this is a new view for some of the enthusiastic advocates of general disarmament. You will find some quotations from Mr. Simonds' talk on page 1279 of this issue.

PUBLICATIONS

U. S. NAVAL INSTITUTE, ANNAPOLIS, MARYLAND

By a decision of the Board of Control, all members are allowed a discount of 10% on books published by the Naval Institute and 5% on those of other publishers (government publications excepted).

AVIATION

Naval Aviation. Revised edition. New illustrations. 1929. 140 pages. $1.75 postpaid.

Airplanes, Airships, and Aircraft Engines.
By Lieut. Albert Tucker (CC), U. S. Navy. 1921. 436 pages. $3.50 postpaid.

ENGINEERING

Naval Auxiliary Machinery.
Compiled by officers of the Department of Engineering and Aeronautics at the Naval Academy, this book covers auxiliaries used in the naval service. 1929. 152 pages; 11 folders; many illustrations. $3.50 postpaid.

Principals of the Basic Mechanisms.
By Lieut. Comdr. R. N. S. Baker (CC), U. S. Navy, and Associate Professor W. E. Farrell, U.S.N.A. 1926. 135 pages. $3.75 postpaid.

Engineering Materials and Processes.
Is the successor of Danforth's *Mechanical Processes.* By Lieut. Comdrs. G. B. Ashe and J. I. Hale (CC), U. S. Navy. Reprinted 1930 with slight changes and corrections. 267 pages. $2.50 postpaid.

Internal Combustion Engines.
By the Department of Engineering and Aeronautics, Naval Academy. Fourth edition. 1931. 300 pages. $4.25 postpaid.

Naval Reciprocating Engines.
Compiled by Lieut. Comdr. L. P. Bischoff, U. S. Navy. Some material has been taken from *Naval Reciprocating Engines and Auxiliary Machinery,* by Barton and Stickney, and new material added. 1929. 208 pages; many illustrations. $2.50 postpaid.

Marine and Naval Boilers.
Compiled by officers of the Department of Engineering and Aeronautics, Naval Academy, this text has been completely rewritten with the exception of Chapters VI and X. 1929. 194 pages; 16 folders; many illustrations and diagrams. $3.00 postpaid.

Naval Turbines.
By Commanders O. L. Cox and M. A. Libbey, U. S. Navy. 1924. 241 pages with many illustrations and drawings. $5.00 postpaid.

Storage Battery Manual.
By Lieutenant Commander L. C. Dunn, U. S. Navy. 1920. 400 pages. $5.00.

LANGUAGES

French Nautical Phrase Book and Reader.
By Professor P. J. des Garennes, U.S.N.A. 1921. 181 pages. $1.50 postpaid.

Writing and Speaking: a Handbook for Naval Officers.
By Professor Carroll S. Alden, U.S.N.A. (This book replaces *Composition for Naval Officers.*) 1927. 359 pages. $2.50 postpaid.

LAW

International Law for Naval Officers.
By Comdr. C. C. Soule, U. S. Navy, and Lieut. Comdr. C. McCauley, U. S. Navy. 245 pages. Revised 1928 by Lieut. Comdr. C. J. Bright, U. S. Navy. $2.00 postpaid.

Constitutional Law.
Reprinted 1924. By H. J. Fenton, M.A., LL.D. 351 pages. $2.25 postpaid.

MATHEMATICS

Elementary Mechanics.
A complete revision of the 1922 edition, by Professor Paul Capron and Associate Professor L. T. Wilson, U.S.N.A. 1926. 473 pages. $5.00 postpaid.

MISCELLANEOUS

Some Stories of Old Ironsides.
By Commander H. H. Frost, U. S. Navy. This pamphlet on the Constitution is very attractively gotten up. 30 pages and 8 illustrations. 1931. $.25.

Naval Leadership: With Some Hints to Junior Officers and Others.
Third edition. 1929. 178 pages. $1.50 postpaid.

A Digest of Naval Communications.
Compiled by Lieutenant Commander James M. Lewis, U. S. Navy, primarily as a textbook for midshipmen, but the book will also provide an excellent text for officers preparing for examinations for promotion. 1928. 98 pages. $1.25 postpaid.

Matthew Fontaine Maury.
By Professor Charles L. Lewis, U.S.N.A. Foreword by Commander Byrd, U. S. Navy (Retired). A biography every American should read. 1927. 264 pages. $6.00 postpaid.

Man-of-War's Man's Manual.
By Rear Admiral R. R. Belknap, U. S. Navy (Retired). 1928. 241 pages, illustrated. $.65 postpaid.

Yankee Mining Squadron.
By Captain R. R. Belknap, U. S. Navy. 1920. 110 pages, illustrated. $1.00 postpaid.

Routine Book.
By Captain R. R. Belknap, U. S. Navy. 1918. 308 pages. $1.25 postpaid.

Index to Proceedings (Nos. 1 to 100) and (Nos. 101 to 200). $1.50 each, postpaid.

U. S. Navy Cook Book.
By School for Cooks and Bakers. U. S. Naval Training Station. Newport, Rhode Island. 1920. 130 pages. $.60 postpaid.

Physiology, Hygiene and First Aid.
By Captain R. G. Heiner (MC), U. S. Navy. 1928. 219 pages. $1.85 postpaid.

Manual of Athletic Requirements.
By Lieutenant Commander W. A. Richardson, U. S. Navy. Revised and enlarged edition. 1927. 692 pages. Profusely illustrated. $4.50 postpaid.

NAVAL CONSTRUCTION

Principles of Naval Architecture and Warship Construction.
By Lieut. Comdr. G. C. Manning (CC), U. S. Navy, and Lieut. T. L. Schumacher (CC), U. S. Navy. A treatise especially prepared to furnish in compact form the information required by the operating personnel of the U. S. Navy. Revised 1930. 395 pages, illustrated. $4.50 postpaid.

Naval Artificer's Manual.
By Lieut. McCall Pate (CC), U. S. Navy. 1918. 797 pages. $2.00 postpaid.

NAVAL ORDNANCE

Exterior Ballistics.
For the instruction of midshipmen. By Lieutenant E. E. Herrmann, U. S. Navy, under the direction of the Head of Department of Ordnance and Gunnery. 1930. 354 pages with tables and figures. $4.50 postpaid.

Range and Ballistic Tables.
Prepared for use of midshipmen as an auxiliary companion volume for *Exterior Ballistics*, and contains tables required with the latter textbook. 1930. $2.25 postpaid.

Naval Ordnance.
A textbook prepared for the use of midshipmen by officers of the United States Naval Academy. Reprinted 1928 with corrections. 641 pages. $6.00 postpaid.

NAVIGATION

Aquino's "Newest" Sea and Air Navigation Tables.
By Commander Radler de Aquino, Brazilian Navy. For solving all problems by inspection. The simplest and readiest in solution. The safest and the most exact. 1927. 171 pages. $5.00 postpaid.

Navigation and Nautical Astronomy.
By Captain Benjamin Dutton, U. S. Navy. Third edition. 435 pages. 1930. $4.50 postpaid.

Navigation and Compass Deviation.
By Comdr. W. C. Muir, U. S. Navy. 1918. 784 pages. $4.20 postpaid.

Practical Manual of the Compass.
By Captain Harris Laning, U. S. Navy, and Lieut. Comdr. H. D. McGuire, U. S. Navy. 1921. 234 pages, illustrated. $3.90 postpaid.

Line of Position Book.
By Lieut. Comdr. P. V. H. Weems, U. S. Navy. 1928. 44 pages. $2.50 postpaid.

Azimuth Diagram.
Large separate diagram to accompany *Line of Position Book*. 1928. $.80 postpaid.

From "Where You Are" to "Where You Want to Go."
By Lieut. Comdr. Karl R. Shears, U. S. Navy. An elementary treatise of the mooring and maneuvering board. 1929. 37 pages, paper. $.50 postpaid.

PICTORIAL

Around the World with the Fleet, 1907-1909.
280 pages of the finest half-tone engravings showing pictures taken on this epic cruise. 1929. $3.50 postpaid.

The United States Fleet.
Second edition. By Lieutenant F. A. Edwards, U. S. Navy. A ready source of information and a pictorial acquaintance with the fleet. 1929. 80 pages; many illustrations. Paper. $.50 postpaid.

RADIO

Robison's Manual of Radio Telegraphy and Telephony.
Eighth revised edition. By Captain S. C. Hooper, U. S. Navy. 791 pages, illustrated. 1928. $4.00 postpaid.

Radio Manual.
Fifth edition. A textbook for midshipmen. Prepared for the Department of Electrical Engineering and Physics. 1931. 189 pages. $3.50 postpaid.

SEAMANSHIP

Watch Officer's Guide.
By Commander W. S. Farber, U. S. Navy. About 200 pages of text, 50 colored plates of flags, and a table of honors. 1930. $2.00 postpaid. Additional copies of the table of honors can be procured for ten cents each.

On a Destroyer's Bridge.
By Commander H. H. Frost, U. S. Navy. An officer's experience in handling a destroyer. 120 pages. 1930. $2.00 postpaid.

STRATEGY AND TACTICS

We Build a Navy.
By Lieutenant Commander H. H. Frost, U. S. Navy. A vivid and dramatic narrative of our early navy. 1929. xvi+501 pages, 33 illustrations. $4.00.

The Dardanelles Expedition.
Second edition. By Captain W. D. Puleston, U. S. Navy. A critical study of this amphibious undertaking. 1927. 172 pages including 70 illustrations. $2.80 postpaid.

Five Years in Turkey.
By General Liman von Sanders, Chief of the German Military Mission to Turkey. Translation by Colonel Carl Reichmann, U. S. Navy (Retired). 1927. 340 pages, illustrated and three military maps. $3.50 postpaid.

The Battle at Blanc Mont.
By Lieutenant Colonel Ernst Otto, German Army (Retired). This interesting analysis, which appeared in the PROCEEDINGS, is now in book form. 140 pages, illustrated. 1930. $2.00 postpaid.

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1927. 266 pages. $.85 postpaid

Landing Force Manual.
1927. 5½ x 9. 703 pages. $1.70 postpaid

Ship and Gunnery Drills.
1927. 350 pages. $.80 postpaid

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Special Notice

Naval Institute Prize Essay, 1932

A PRIZE NOT TO EXCEED FIVE HUNDRED DOLLARS WITH A GOLD MEDAL, and a life membership in the Institute (unless the author is already a life member, in which case he will receive the commuted value thereof), is offered by the Naval Institute for the best essay submitted on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award of the prize to be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay to the Secretary-Treasurer in a sealed envelope marked "Prize Essay Contest." The name of the writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside and the writer's name and motto inside. This envelope will not be opened until after the decision of the board. Essays must be received on or before January 1, 1932.

3. In addition to the "Naval Institute Prize," one or more essays may receive "Honorable Mention," if of sufficient merit to justify that award; or, in the event that no essay is adjudged of sufficient merit to receive the "Prize," the best essay submitted may receive "Honorable Mention" in lieu thereof.

4. In case one or more essays receive "Honorable Mention" the writers thereof will each receive a prize, the amount of such awards to be decided by the Board of Control in each case.

5. Announcement of awards will be made as soon as practicable after January 1, 1932.

6. Essays awarded the "Naval Institute Prize" or "Honorable Mention" will be published in the NAVAL INSTITUTE PROCEEDINGS as soon as practicable. Essays not awarded a prize may be published at the discretion of the Board of Control, and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

7. Articles should be limited to approximately 8,000 words, but shorter articles will receive equal consideration.

8. In event of the prize being awarded to the winner of a previous year, a gold clasp suitably engraved will be given in lieu of the medal.

9. All essays must be typewritten, double spaced, and submitted in duplicate.

C. H. McMORRIS

Lieutenant Commander, U.S.N., Secretary-Treasurer